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Person-Job-Match (PJM) – Beyond the "More is Better" Paradigm

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14. ABSTRACT

Paper addresses the logistical and legal challenges in utilizing non-cognitive measures for initial job classifications in the U.S. Air Force. All enlisted military applicants go through a series of steps in order to be assigned a job. Initially these steps include qualification tests like the Armed Services Vocational Aptitude Battery (ASVAB) to make sure recruits meet Congressionally-mandated minimum requirements. Once initial qualification tests are administered, psychological and medical fitness exams follow. Once all the requirements are meet an enlisted applicant is assigned a job. This paper looks to explain the use of measures that go above and beyond aptitude and ability and examine how issues of motivation, temperament, and inter-personal skills can help add predictive confidence to the person-job-match (PJM) equation. One particular measure discussed in the paper is the Self Description Inventory (SDI+).

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Abstract

The US military employs a multi-step process to assign jobs to new enlisted applicants. The first step is a series of Department of Defense (DoD) qualification tests known as the Armed Services Vocational Aptitude Battery (ASVAB). Once an applicant meets the Congressionally-mandated minimums for military service, they are further assessed for psychological and medical fitness. Each branch of the US military (Army, Navy, Air Force, Marines) then applies its own standards for entrance into specific career fields.

Because enlisted applicants tend to be around high-school age, the military expects to make large investments in entry-level training to produce mission-ready service members. Since training demands vary from career field to career field, new recruits are assigned to career fields where their service-unique ASVAB composites (and possibly some special test scores) indicate a reasonable probability of success in training.

In the early 1960s it was recognized that over and above these "aptitude and ability" measures there was additional variance that could be explained using measures of motivation, temperament, and inter-personal skills. These non-cognitive assessments are measures of individual differences not predictable from general intelligence ("g") tests. The premise is, then, if "g" scores can predict the ability to be successful in a given career field, the non-cognitive measures could add predictive confidence by adding temperament or dispositional measures in the person-job-match (PJM) prediction equation. This paper addresses the logistical and legal challenges in operationalizing non-cognitive measures for initial job classifications in the United States Air Force.

IMTA 50th Jubilee – Opening Remarks

Good afternoon, and welcome to the 50th Conference of the International Military Testing Association. The topics covered this afternoon represent research which dates back before the first "MTA" conference in 1959. Even by this time the United States military had recognized that recruiting diverse high school aged youth offered challenges in getting the right person into the right job family or career field. We call this process the military personnel pipeline. The personnel pipeline draws from the general population, screens and classifies applicants into career field, trains recruits in needed military skills, and posts and promotes service members throughout a full military career. This presentation will only provide the highlights of the paper which documents 50 years of person-job match efforts in the military, more specifically, in the United States Air Force.

Job Assignments by Direct Applicant Preferences

As early as the late 1940s when the United States Air Force was created, it was recognized that creating job classifications stratified primarily on aptitude or ability test scores alone did not capture all that was needed to get the right person into the right job. The Air Force explored many possible "add-ons" to the aptitude-based personnel allocation system. These research streams (primarily for the high school aged enlisted corps) included using preference data from recruits for such things as "Vocation," "Base," "Geographical Amenities," and more. Time and again it was demonstrated that fulfilling the high school student's preference did not translate into any significant benefit in terms of *training* or *career success*. It was hypothesized that these students either lacked a realistic view of what these choices actually meant or that satisfying these preferences were really not important to ensure a successful Air Force career.

High School Aged Job Choices – The Evidence

In the early 1960s, the United States government launched a program called "Project Talent." The purpose of Project Talent was to track how (and how well) high school students picked their occupational career path. This project covered occupations across the entire US economy and the military only represented about 3% of the job choices. Following initial data collections, five-year follow-ups were conducted and reported in 1971 (just before the U.S. military dropped its draft and became an all-volunteer force.) There were anecdotal predictions that all high school students just "knew" what they wanted to be and they would follow that career path. There were other pundits who said the opposite – that the high school population didn't have a clue about the real world and could be shaped into any desired course of study. Project Talent proved both opposing views were true – but it depended on both the student and the choice of career field. Overall, however, it was found that the majority of high school students had changed their career plans within five years of leaving high school. Since this project covered all high school students it included many professions other than the military. Those fewer students who "stuck with" their career choices were those who had picked the most educationally challenging careers (lawyers, doctors, accountants) and were, for the most part, college bound.

The Air Force and the Person-Job-Match (PJM) Initiative

Long before Project Talent was launched, the Air Force had committed to research to improve the quality of the match between potential applicants, recruits, trainees, and returning service members. This 30-minute presentation and the comprehensive paper on which it is based will document that 50-year effort.

The Big Five – Then and Now

Even before the early 1960s, the US military had recognized that cognitive/aptitude tests can only go so far in predicting success in training, and much less so in actual job performance. Many sources from that era may be summarized with two quotes from the May 1960 Tri-Service Conference on Selection:

In the Air Force, at least, we have reached the point of diminishing returns from routine test development and systematic validation against training criteria… This becomes apparent when one stands back and looks at the progress we have made as a result of research conducted during the last twelve to eighteen years. (Christal, 1960).

Aptitude tests are designed to measure what a man can do – they have nothing to say about what the man will do. A man's self-confidence, his carefulness, his persistence in spite of boredom, his decisiveness, his creativity, and many other personality characteristics will have an obvious effect on his eventual success in almost any field of endeavor. Tests of these characteristics – and, of course, many others – are badly needed to supplement the information we get from measures of intellectual capacities. (Mullins, 1960).

Aside from the archaic gender reference, both these observations still ring true today. This Tri-Service Selection conference followed a major Air Force study of prevailing work in the domain of personality measurement. The fruits of that Air Force work have become known as the Big Five Factors of Personality – which the Air Force allowed to go into the public domain. The Big Five Model (BFM) is alive and well after fifty years. Commercial instruments are available that draw heavily on the BFM and the Air Force routinely pays a vendor to use these instruments on pilot candidates. There is an international public domain effort available today on the Internet at the International Personality Item Pool < http://ipip.ori.org/> (Goldberg, et al, 2006). Individuals may take a survey for free and see their own "Big Five" scores with many elaborating (and illuminating) facet-level breakouts at < http://test.personality-project.org/> Professional journal articles still debate the merits of the Big Five Model versus alternative proposals. The Big Five model is suggested as the best way to measure expected performance on the job where quick reactions are required in the 2005 popular psychology best seller – *Blink* by Malcolm Gladwell – author of *The Tipping Point*. Gladwell cites many examples which include military war games and civilian police officers.

Air Force and the Big Five

What is it about the Big Five Model that is so compelling? It is important to note the nature of the work done by the Air Force in the late 1950s. Their goal was not just to advance the science of psychology, but rather to capitalize on the work of others to create an operational method to better assign airmen into jobs. The data bases of many researchers were contributed to this study. With the help of newly acquired computing

hardware and custom-built factor analytic software, the Air Force uncovered the most stable structure underlying data from many professional sources and many rater paradigms (peer ratings, supervisor ratings and self-ratings).

Part of the Big Five's success has to do with its intended usage. The purpose of the Big Five's development was to create an instrument to help classify airmen into job. In other words, the Air Force's Big Five instrument (called the Self-Description Inventory – SDI) was to aid in CLASSIFICATION (person-job-match) rather than to screen-out unsuitable applicants (i.e. SELECTION). Unlike other psychological instruments such as the Minnesota Multiphasic Personality Inventory (MMPI), the purpose of the SDI was not to be diagnostic of particular defects, but rather to be indicative of strengths in areas relevant to various occupational areas – perhaps the reason for its widespread acceptance and usage in the wider professional and business community.

Job Compatibility Assessment (JCA)

There is a common misconception that a "test" is either "valid" or "invalid." Professional test developers understand, however, that two copies of the very same selection test can be submitted for review under the Uniform Guidelines for Employee Selection (29 CFR Part 1607) and have different approval outcomes. One test may be "approved" while the other (identically the same) can be "rejected." The key issue is the validation evidence presented to support the claim of supporting a fair process for employee selection. Under the Uniform Guidelines, it is important to note that a selection "process" must take into account not only the test "instrument" but also the attributes of the applicant population (the people who will TAKE the test) and the bona fide requirements of the target job (the job demands). Tests do not stand alone – they are designed to perform a person-job-match for a given applicant pool for a given job class.

In the 2007 IMTA paper, the authors covered the challenges in using a "behavioral affirmation" instrument in U.S. federal government – with a focus on the enlisted military force. Since that time we have had the opportunity to work a highly related project for the hiring of civilian police officers to augment the military police on state-side Air Force bases. This project is called the Security Forces Job Compatibility Assessment (JCA) Project. The JCA Project was guided by an outside consultant who had developed a similar instrument for the Las Vegas Police Department.

The target job for the JCA is a brand-new Air Force position and there are no civilian (civil-service) job incumbents. While the new civilians were to work "interchangeably" with their military counterparts – they would be governed and evaluated using civil service regulations. The JCA Project brought stark clarity to the issues of defining when an applicant pool "is the same" and when the "job is the same." It was clear that the best which could be accomplished was the development of an "interim" instrument for which data collection could be conducted on the "real" applicant pool and validated, after time, on the "real" job hires.

The JCA instrument developed on military personnel was validated against military job performance but that was not deemed truly parallel to evaluate (and screen) the newly forming civilian applicant pool. It is expected that the same "interim" JCA instrument will be found to be valid (with possible minor alterations) for the new civilian applicant pool. Because the JCA instrument is to be used as part of a larger screening process, a valid, scientific "cut-score" can only be determined for this applicant pool after those interim data are allowed to mature into actual civil-service performance measures (absenteeism, disciplinary actions, performance reports, attrition, etc.)

Although the items in the Job Compatibility Assessment (JCA) instrument were drawn from the "Big Five" and related sources like the International Personality Item Pool, the actual purpose of the JCA was that of a "screener" to screen-out ill-suited applicants for employment in a target job. Because of the gravity of the hiring outcome, the standards for establishing test validity in denying a person a given job are very high.

Vision for the Self-Description Inventory (SDI+)

The SDI+ -- NOT a Tactical Solution

The tactical solution to a training attrition problem in a job family is to develop a screener for that job family. The problem with targeted solutions is that they are the most prone to compromise. With today's Internet generation, compromise spreads at electronic speeds and is hard to combat. Whether the compromise is done free for friends or for profit by commercial interests, the damage is the same. The Graduate Management Admission Council recently (June 08) won a $2.35 million copyright-infringement suit against a web site charging for access to their compromised highly controlled test materials for the Graduate Management Admission Test (GMAT). About 200,000 students take the GMAT each year and its scores are used by more than 4,000 graduate programs at 1,800 business schools worldwide.

Creating a single-focus "high-stakes" go/no-go hurdle invites cheating of one kind or another. For interest-personality questionnaires, "cheating" translates into "faking" by giving socially desirable or providing compromised answers to key selection questions (Birkeland, et al, 2006). This was recognized even before the Internet:

It is common knowledge that scales are more likely to be falsified either consciously or unconsciously when used for job selection than in either job classification or a counseling situation. The amount of faking probably depends on what the examinee has at stake in the situation. (Zaccaria, Borg, & McCollum, 1960).

For this reason, the ultimate vision for the Self-Description Inventory (SDI+) is that of a pre-recruiting and in-service career counseling tool with a focus on person-job-match (i.e., classification) rather acting as a "Go/No Go" employment determination.

The SDI+ -- A Strategic Solution

Attracting the RIGHT Applicants

The SDI+ vision is a multi-phase strategic solution. The proposed SDI+ process would not only move initial Air Force career exploration way out in front of traditional recruiting efforts, it would also be used in retention counseling. Waiting to test students lining up at the schoolhouse steps is too late in the process for effective person-job matching. The goal must be to encourage the RIGHT students to apply to the recruiters in the first place. More and more with our Millennial Generation (people born since 1980) we are dealing with potential applicants who are Internet savvy and who have the kinds of skills and abilities we need for emerging and demanding Air Force commands like Space, Intel, Meteorology, and Cyber for example.

Matching To the RIGHT Jobs "Up-Front"

Because the SDI was originally designed to be robust and cover the entire waterfront of normal behavior, it can be used to "select-in" rather than "select-out" applicants across the entire spectrum of Air Force jobs. While each Air Force job family may have a constellation of particular items which will indicate success, the total number (220) is short enough to be administered to all applicants. The reason this is important will be discussed later under retention opportunities. The SDI+ is not a replacement for current aptitude and psychological screening performed throughout the enlistment process. The focus of the SDI+ is to motivate and direct potential applicants into the Air Force jobs that best suit their personal temperament (and reenlistment intent).

Offering a Constrained, Ordered Job List

The output of the SDI+ process would be a constrained list of Air Force jobs, in descending order of "goodness of fit" between the person's temperament and current Air Force needs. By having the SDI+ centrally managed, the list of job families shown could be restricted to only those currently with scheduled classes (more on this below). Even though the list may be constrained, the choices would always be shown in descending order based on matching the applicant's SDI+ constellation. If an applicant sees a job of interest, he or she would be encouraged to see a recruiter about taking the Armed Services Vocational Aptitude Battery (ASVAB) to see if they meet the mandatory aptitude requirements for that career field. If an "in-service" person is thinking about reenlisting and retraining into another career field, they too could use the site and talk to their career counselor about these opportunities.

Applicants would be informed that ONLY currently available jobs are being shown – that they should try back again later if they don't see anything interesting at the present. The Millennial Generation is known for its reliance on the Internet for monitoring volatile information sources and, what would be seen as an inconvenience for older generations, is viewed as an engaging challenge to the very kind of applicants that are being sought.

Determining a GOOD Job Fit (Aptitude)

The current Air Force classification system and its mandatory requirements for entrance into each Air Force Specialty Code (AFSC) is doing a monumental job in keeping training attrition within manageable levels. The academic requirements for entrance into Air Force Specialties (AFSs) are established using the current Air Force Aptitude Composites of Mechanical, Administrative, General, and Electronic (MAGE) scores. The MAGE scores are derived from historical equations using subtests of the DoD's Armed Services Vocational Aptitude Battery (ASVAB). Although there is discussion about replacing these 50-year old MAGE composites with more modernized equations, there is nothing in this SDI+ vision that suggests removing or side-stepping mandatory minimums as the primary qualification screen.
Other than being used as a counseling tool, it is suggested that perhaps the SDI+ indicators may be considered in evaluating and granting aptitude waivers of say, 5 points on the aptitude score in cases where the SDI+ indicates a good job match.

Determining a GOOD Job Fit (Attitude)

As noted earlier (in the 1960s), aptitude tests can fairly well predict if a person CAN perform the (academic) training requirements. Those same tests, however, do not predict how well the person WILL apply himself or herself and perform those training requirements (i.e., conscientiousness). Presently, people are assigned to Air Force Specialties based on their aptitude test scores (MAGE). Recruiters negotiate with applicants with regard to their career desires and current Air Force classroom vacancies. While there will be some high school students who have a fixed idea of what job they want, one of the few comprehensive historical longitudinal studies (Project Talent, 1971) demonstrated that a high percentage of high school students career plans tend to undergo major revisions within five years of leaving high school. Today's Internet is changing that trend by making more realistic information available earlier. Recent studies of the Millennial Generation indicate that Millennials expect to change careers several times within their working years. (Brazell, 2005). This perspective fits well with Air Force Recruiting Service's traditional focus on selling the Air Force as "a way of life," rather than just an individual job opportunity.

From this mixture of how people end up in various Air Force jobs, at present, we have some people who feel that they are a "good" fit with the job and others who, although they do a good job (i.e. are conscientious), they are not in the best fitting job. This can be measured – and has been for the past 30+ years. As part of their efforts to keep promotion tests "on track," the Air Force Occupational Measurement Squadron surveys each career field about once every three years. In addition to detailed task statements, there are a number of job satisfaction questions which have been routinely collected for over thirty years (Gould, 1972). The two most important questions in this category are a "Job Interest" and "Use of Talents and Training." These two variables, have, over the years, identified career fields with major satisfaction problems (usually when military

functions were being civilianized) as well as isolating pockets within a given career with special challenges.

Operationalizing a "goodness of fit" measure within an Air Force Specialties simply means adding the SDI+ to the standard occupational survey during the next routine cycle and then identifying constellations for personnel with high job satisfaction. Since these surveys are administered over the Internet, the standard survey could include a branch to only solicit SDI+ responses from people who respond high or low on key questions. Logistically, rather than expanding every routine job inventory, it may be more pragmatic to conduct a targeted "follow-up" survey to only high and low job satisfaction personnel immediately following a standard occupational survey. In any case, anyone asked to participate will be identified as a "virtual mentor" helping to build a better future career field for those who come later.

GOOD Fit in a Changing Air Force

One important observation is that the SDI+ data will be collected with links to the Air Force Occupational Analysis survey program. In this way job satisfaction constellations can be tied to the "job-type" level. Every Air Force Specialty Code (AFSC) is actually composed of many related jobs called job-types. Each job-type may present differing job satisfaction reinforcement patterns. There will be no attempt to "average" across these patterns to force one profile for a given AFSC – all constellations which represent personnel with high satisfaction will be given equal status. Hence, a single AFSC may have 10 to 20 constellations for identifying people with high job satisfaction across the AFSC's set of job-types.

Past research on Air Force classification restructuring (the Job Structuring Technology – JST Project, 1994) demonstrated that when career fields were restructured and AFSCs changed, in many cases, the original "job types" still remained. Although combined with new job types and other job-types disappearing, any SDI+ system that is anchored at the job-type level will be the most resilient with respect to a changing Air Force classification system.

"My Base" and the Virtual Air Force

Putting the SDI+ Out-in-Front

The ultimate vision, then, is to put the SDI+ out on the Internet to increase recruitment – not to turn away or discourage people who have already talked to a recruiter. Logistical problems are nearly insurmountable for "adding" an SDI-like process into existing DoD Military Entrance Processing Stations (MEPS) or Air Force Recruiting Service (AFRS) programs.

Fortunately, for future planning purposes, there is an emerging alternative – and one which promises access to the very kind of highly computer-savvy applicant being sought. The Air Force Air Education and Training Command (AETC) is working a plan called

"My Base" which is envisioned as a virtual reality for the Air Force. Parts of My Base are expected to come on line within 3 - 5 years. My Base is a three-tier system. The first tier would be open to the public to explore the Air Force including as a career option. This would be the ideal location for the SDI+ on the Internet – and could be augmented with realistic job previews to ensure that applicants have reality-anchored expectations even before talking to a recruiter.

Virtual Courses - Implications

Early designs for "My Base" suggested that Tiers 2 and 3 would be restricted to Air Force members. While Tier 2 would handle administrative matters, Tier 3 would be designed to support virtual courses. Outside of the delayed enlistment program (DEP), recruiting goals are closely shaped by the availability of classroom seats. With virtual classrooms perhaps a wider the timeframe will be given to recruiters to sign up applicants --- allowing them more opportunity to improve the person-job match.

Another challenge/opportunity for strategic force management has to do with filling "hard to fill" AFSCs. Studies have shown that prior service personnel tend to fair better in training for some of the high demand AFSCs. The training community, however, points out training any higher ranking personnel costs more (in student-personnel salaries.) Studies need to be conducted to establish realistic "break-even" points on training more senior personnel versus lower the attrition rates. The challenge that this presents to force management is that it is harder to project AFSC staffing levels when you have people laterally crossing AFSC boundaries in mid-career – even though it serves the best mission interests of the Air Force.

While the My Base initiative may not have much impact in AFSCs with physically demanding training, the impact on academics for in-service personnel may be significant. Consider a scenario with Joe, an E-4 active duty member with three years active duty in the Security Forces (3P0X1) who decides he wants to stay with the Air Force, but not as a Security Forces member. Assume he wishes to retrain into a programmer career field (3C0X1) and reenlist. During his last year in Security Forces, at night he could use My Base to access the training materials for the programmer job and, in fact, save the cost of his training (his salary) while still serving in his Security Forces position during the day.

What if we consider access to My Base-training materials as an in-depth realistic job preview? By taking My Base training on his own time, if this airman determines that the programmer job isn't really for him, he still has time to choose a different career for planning reenlistment and cross-training. At this point, using the web-based SDI+ under My Base, Joe can access a list of jobs he may know nothing about – except that people like him found high satisfaction in those Air Force jobs.

SDI+ - Laying the Foundations

Historical work on the Original SDI

Before proceeding on implementation of the major SDI+ vision as outlined above, it is important to lay a firm foundation on which to build a sound personnel program. This is an effort which has been ongoing for over fifty years and the evidence is now compelling.

The Documentation Trail

The current USAF Self-Description Inventory Plus (SDI+) traces its roots back to research in the late 1950s. This work ranged from developing "keys" for biographical and activity lists through analyzing peer ratings up to the current target of improving person-job-match using self-ratings of behavioral affirmations. This historical work (along with other Air Force Human Resources Laboratory (AFHRL) personnel research) has been collected into a searchable DVD archive with more than 1,100 technical reports (4.1 GB). In addition, key SDI and ASVAB related reports (full text – with some item-level redactions) have been placed online for quick access during this development project. The public web URL addresses for these pages are available upon request while the indexed AFHRL Tech Report DVD is only available to qualified requestors.

The Learning Abilities Measurement Program (Project LAMP)

Air Force research using "personality" for service-wide person-job-match was highly active in the late 1950s and waned until the early 1990s with the launching of Learning Abilities Measurement Program (Project LAMP). During the intervening years sporadic research tended to focus on specific enlisted occupational areas, prediction of officer career potential and the screening of candidates for pilot and navigator training slots.

The Reasons for Project LAMP

Dr. Raymond E. Christal was the scientific lead in establishing the Learning Abilities Measurement Program (Project LAMP) in the early 1980s -- a project aimed at measuring a person's learning ability as a valid indicator of the person's true ability to benefit from Air Force technical training. In the late 1970s, early 1980s, it was recognized that there was a growing diversity in the applicant population – in an all volunteer military. There was a concern that standardized aptitude tests may not reflect an applicant's true potential value to the Air Force. This concern was addressed at the DoD level by conducting nation-wide surveys to re-norm the ability standards for the tests in the Armed Services Vocational Aptitude Battery (ASVAB). The goal of USAF Project LAMP was to identify applicants who do not perform well on standardized cognitive tests which may have any number of causes including historical lack of access to quality educational systems or the by "English as a second language" issue.

Project LAMP – from Neurons to Person-Job-Match (PJM)

Project LAMP's initial approach centered on measuring applicants' low-level recognition and response speeds – looking for the "snappiness of neurons" as Dr. Christal used to say. These fundamental measurements were followed by measures of "working memory" and finally "learning ability – both verbal and non-verbal"

Dr. Christal was one of the two original researchers who developed the Big Five Model back in the late 1950s. After establishing traditional measures for "individual differences" research, Project LAMP moved into the person-job-match domain. Dr Christal developed the Self-Description Inventory (SDI) for use in various forms (paper and computerized). Baseline data were collected for many enlisted personnel including an evolving SDI instrument. Across versions Christal maintained internal consistency of the SDI inventory with split-half correlations of between .89 and .95. Project LAMP also collected other related tests for measurements to be used in the construct validity analyses. Significant construct validity findings for the final form of the original SDI were published in November 1994. Although Dr. Christal passed away in April 1995, the work was continued under contract with Metrica with cooperative efforts of the University of Plymouth in the United Kingdom. Although these later efforts moved the focus from enlisted to officer personnel, Project LAMP continued to collect SDI data from enlisted personnel until this facility closed in October 1999.

The Air Force Officer Qualifying Test (AFOQT Form "S")

In 1999, work began, under contract to OpTech, Inc, to develop a new form of the Air Force Officer Qualifying Test (AFOQT). This effort expanded from a simple "replacement" version (Form "R") into developing a shorter streamlined version (Form "S") with a new feature – Part 12 – the Self Description Inventory (Plus). Even with the new SDI, the AFOQT Form "S" takes an hour less to administer (now less than 4 hours). Although these SDI changes were finalized in late 2003, the logistics in deploying a new Air Force test (given in over 450 locations) took until August of 2005 for the final AFOQT Form "S" to go operational.

Emergence of the SDI+ from the Original SDI

The final form of Christal's original SDI instrument used both adjectives/traits, and behavioral statements. The final inventory contained 99 behavioral statements and 64 trait words. Due to the research into US and UK officers along with pragmatics of operational large-scale officer testing, the original SDI instrument was modified before being incorporated into the emerging AFOQT Form "S". This new version of the SDI instrument is called the SDI Plus (SDI+) to distinguish it from earlier forms and differs in two significant ways.

The “Big Five” plus 2 for Air Force Core Values

The first change to the SDI was to augment the number of factors from five to seven. Although the “Big Five Factors” had been validated in a number of empirical studies, the decision was made to add two synthetic factors in support of Air Force Core Values. The original Big Five Factors are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (acronym: OCEAN). These original five would be augmented by the two new synthetic factors of “Service Orientation” and “Team Orientation” (ST). These two new factors were designed to support the three Air Force Core Values: “Integrity First”, “Service Before Self”, and “Excellence in All We Do.” With now seven factors instead of five, the name “SDI+” was launched and a new acronym/mnemonic of “OCEAN ST.”

Behavioral Statements – Updated “Look and Feel”

The second change is that the SDI+ does not use a mixture of traits and behavioral statements like the original. The SDI+ is composed of 220 behavioral statements with new items supporting seven factors rather than just the Big Five. The development and validation of the new factors and items was conducted using experimental subjects for both Form “R” and Form “S” trials. These samples were created to reflect the expected mix of incoming talent for the new Form “S”.

The new Form “S” reduced the number of cognitive tests from 16 down to 11 without significant loss of predictive efficiency. Rather than equating the greatly revised Form “S” to the previous 30 years of operational versions (Forms “O”, “P”, and “Q”), new norms were established.

SDI+ Work Accomplished This Year

Since last years IMTA conference in Australia, there has been much progress in evaluating the new SDI+ instrument – primarily using the AFOQT Form "S" instrument in actual operation. As of this conference there are now more than 30,000 SDI+ results on file from USAF officer candidates from 1 August 2005 through 31 August 2008.

SDI+ Confirmatory Factor Analysis (n=23,000)

A hierarchical confirmatory factor analysis was conducted on the SDI+ items from 23,000 cases on the AFOQT master file by Dr Larry Price and VAnalytic, Inc.

Overall SDI+ Factor Fit

With two synthetic factors in this model, it is not unexpected that the VAnalytic final report cites less than desirable overall model fit:

ITEM-LEVEL FACTOR ANALYSIS RESULTS:

Comparative Fit Index (CFI) = .75 (*IDEALLY, SHOULD BE .93 OR HIGHER)
Tucker Lewis Index (TLI) = .74 (*IDEALLY, SHOULD BE .95 OR HIGHER)
Root Mean Square Error of Approximation (RMSEA) = .03 (90% C.I. = .03 - .03) (EXCELLENT)
Standardized Root Mean Square Residual (SRMR) = .07 (EXCELLENT)

"Big Five" Plus Two "Item-to-Factor" Congruence

By examining the standardized regression weights (STDYx – i.e. Pearson Correlation) between the item and its corresponding (mapped) factor total score, the homogeneity of the individual seven factors can be interpreted. As might be expected the original Big Five factors demonstrated the expected mean level of congruence with their mapped items (.441 - .613) – with "Openness" being the most fluid factor. The two synthetic factors presented moderate mean congruence with their items (.319 - ,340). Each of the factors contained maximal items near the "marker" level of 0.70.

Table 1: Item-within-Factor Standard Regression Weight Summaries

STDYx	Open	Consci	Extraver	Agree	Neurot	Service	Team
Min	0.161	0.094	0.103	0.375	0.257	-0.096	-0.083
Max	0.713	0.772	0.849	0.770	0.727	0.673	0.697
Mean	0.4412	0.5763	0.5395	0.6126	0.5802	0.3404	0.3191

The two synthetic factors ("Service Orientation" and "Team Orientation") actually shared some items from other scales as well as having unique items of their own. Hence, the analysis above covers 235 items, only 220 of which are unique.

Overall, the purpose of this confirmatory factor analysis was to demonstrate the original "Big Five" factors are, in fact, properly covered by the new SDI+ instrument. This was confirmed.

Operational SDI+ Constellations (220 Items)

The higher goal within this item-factor analysis, however, remains the same – to develop an effective instrument to improve person-job-matching. There were 21 values (9%) whose STDYx values were less than 0.1. This level is problematic and lowers the both the overall and item-factor metrics above. These "low performing" items don't fit well into the theoretical Big Five or synthetic factors. Even so, decisions to remove or edit any SDI+ items will be deferred until later analyses can demonstrate that these "low performing" items actually have no value for improving the matching process. This is partially motivated that operational use of the SDI+ is intended to use all 220 items in establishing "constellation" patterns for job satisfaction and NOT limit operational use to either 7 factor values nor 22 facet/composite values.

Original SDI (AFSDI) Versus the New SDI+ Instrument

With the "retooling" of Christal's original SDI (AFSDI) into the SDI+ a question arises as to how similar are these two versions? The confirmatory factor analysis demonstrated that the original "Big Five" factors are still represented. This is a very important question as the most compelling validation of the SDI process was accomplished with the older form known as the AFSDI. AFSDI validation studies demonstrated construct validity with a number of related measures including the Air Force Vocational-Occupational Interest Career Exam – VOICE, the NEO® Personality Inventory, and the Air Force-Navy History Opinion and Interest (HOI) Inventory. Most importantly (for operational usage), the "Big Five" (both Air Force and non-Air Force instruments) have shown the ability to add incremental validity in the prediction of training success using the "C" or "Conscientiousness" factor.

The Original AFSDI and Successful Prediction of Job Performance

While the prediction of training success has been documented in various sources over decades, most attempts to relate the Big Five to job performance have not been as consistent (Barrick and Mount, 1991; Barrick and Mount, 2005, Murphy and Dzieweczynski, 2006). Note that Air Force people and jobs are different than those reported in the professional journals. The Air Force classification system assigns airmen to job families based on their ASVAB aptitude scores and trains all incoming personnel – thereby "leveling" ability and competency differences. The Collis report (1996) provides one of the strongest demonstrations of the power of the original SDI instrument (AFSDI) to predict later Air Force job performance. It is noteworthy that in predicting Air Force job performance under these restricted conditions that only "Conscientiousness" and "Extraversion" seem to have little relevance whereas these two are cited as most relevant in the civilian sector studies.

Job performance data were collected from supervisors of 71 airmen who had taken the AFSDI in basic training. Correlations between composite scores on the five AFSDI factors and performance ratings on 10 general dimensions indicated some fairly strong positive relationships between Agreeableness and ratings on all 10 dimensions. Conversely, (and as might be expected) moderate negative relationships were found between Neuroticism and five of the performance ratings that were linked more to interpersonal skills than technical ability. Moderate positive relationships were also found between Openness and four of the performance dimensions linked to interpersonal skills. Preliminary analyses of the relationships between the 22 subcomposite scores indicated much stronger relationships existing between some subcomposites than others. The results indicated that there are potential relationships between general aspects of military performance and certain personality factors. In addition, the performance rating forms employed appear to be able to capture some of the variation in subjects' active duty performance.

Table *5*. Relationship of AFSDI composites and job performance dimension

Rating dimension	**O**	**A**	**C**	**E**	**N**
Technical Knowledge/Skill	.15	.29*	.18	.07	-.23
Initiative/Effort	.20	.39**	.11	.17	-.24*
Knowledge of and Adherence to Regulations/Orders	.26*	.35**	.07	.13	-.24*
Integrity	.27*	.36**	.20	.02	-.21
Leadership	.27*	.40**	.23	.13	-.34**
Military Appearance	*.05*	.27*	.14	.15	-.23
Self Development	.29*	.31**	.17	.20	-.33**
Self Control	.22	.26*	.06	-.13	-.17
Global 1: Technical Proficiency	.04	.33**	.16	.07	-.21
Global2: Interpersonal Proficiency	.35**	.47**	.20	.01	.24*

* p<.05 **p<.01 Collis (1996)

Historical Stability of the AFSDI

The SDI+ seems to represents a major restructuring of the original AFSDI. In addition to dropping "traits" or "adjectives" in favor of behavioral statements, new factors and items were added.

The AFSDI, itself, went through many developmental versions (67-, 105-, 206-, 190-, and 163- item versions) before being finalized. The most major historical conversion was from a paper and pencil version to a computerized version. The paper and pencil version used an opscan answer sheet to record a standard 5-point Likert scale of "Strongly Disagree" to "Strongly Agree". The computerized version displayed items as shown below and recorded a 45-point response range (-22 to +22) based on a mouse click.

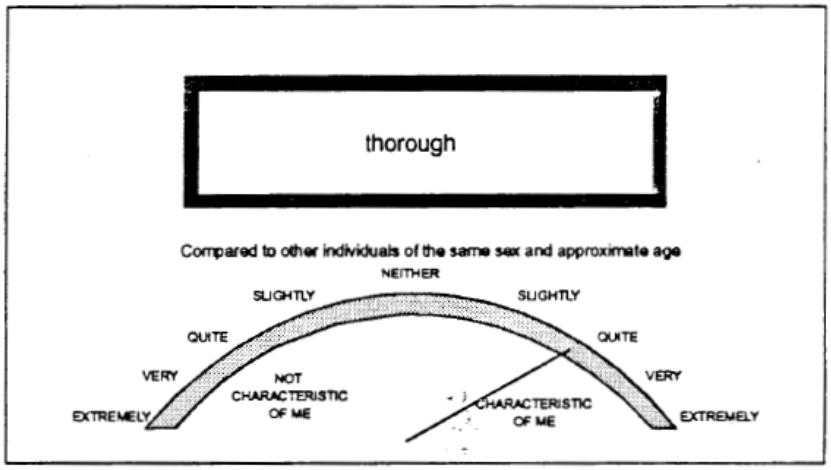

Figure 1. Rating Scale for Trait names

The initial computerized version of the AFSDI showed unintentional consequences – a predominance of ratings at the center and extremes of the scale. While this effect was mitigated by redesigning the operation of the mouse, the large number of neutral ratings triggered another observation. The limited verbal skills of the lower quartile of the basic trainee population had a significant impact – especially for single-word trait items.

> When using the rating scale, about 38% of the subjects rated themselves at the zero point or at one of the two extremes on at least 30% of the traits. This was believed to be at least partially due to the ease of recording these particular responses. If one simply presses the button when a trait is presented, a zero response is recorded. On the other hand, if the mouse is slid hard to the right or the left, the cursor automatically stops at the extreme points of the scale, making it easy to record these levels. It was noted that at least part of the zero responses could have been due to vocabulary deficiencies. If a subject does not know the meaning of a trait term, the safest action is simply to rate it at the zero point. The number of zero responses correlated .38 with verbal ability as measured by a combination of the Word Knowledge and the Paragraph Comprehension tests in the ASVAB. On the other hand, there was no correlation between verbal level and the number of ratings recorded at the extremes.

The item-selection process for the AFSDI started with 425 candidate items – survivors from the 205 trait names inventory and 220 behavioral statements. Christal noted that most "Big Five" research was typically conducted using college student volunteers with higher verbal abilities. Christal removed those single-word trait/adjective items which were shown to be archaic or correlated with the limited verbal skills of the basic trainees. The final AFSDI had 163 items, 64 trait/adjectives and 99 behavioral statements.

Split-Half Reliabilities

This final AFSDI form was subjected to various evaluations. The split-half reliabilities (with Spearman-Brown "corrections" to full length) were:

Reliabilities of Composite Scores

VARIABLE	SPLIT-HALF	FULL LENGTH
EMOTIONAL STABILITY	.925	.961
CONSCIENTIOUSNESS	.886	.939
EXTROVERSION	.888	.941
AGREEABLENESS	.889	.941
OPENNESS/INTELLECT	.858	.924

Stability of the Composites – Across Development Samples

Two samples were used to develop and cross-validate composite scoring logic. The development sample consisted of 1644 subjects while the cross-validation sample was composed of 1209 subjects. Based on each factor analysis, a factor composite formula was determined by unit weighting any item with a factor loading of 0.4 or greater. The correlations of the composite based on 1644-case sample with the composites developed from the target 1209-case sample ranged from .92 to .96 for the Big Five Factors.

Cross Validation of Composite Scores

In order to cross-validate the composite scores they were computed for the 1209 subjects, using the weights developed in the 1644-case sample. Then they were correlated with factor scores computed in the 1209-case sample. The results of this analysis are presented below:

Table 2
Cross-Validation of Composite Scores

	Neuroticism Factor (1209-Case Samp.)	Conscient. Factor (1209-Case Samp.)	Agreeable. Factor (1209-Case Samp.)	Extroversion Factor (1209-Case Samp.)	Openness Factor (1209-Case Samp.)
Neuroticism Composite	**.94**	-.19	-.17	-.15	-.10
Conscient. Composite	-.18	**.92**	.23	.09	.18
Agreeable. Composite	-.18	.24	**.93**	.16	.08
Extroversion Composite	-.27	.07	.11	**.94**	.02
Openness Composite	-.11	.17	.09	.03	**.96**

Identification of Subcomposite (Facet) Scores

Subcomposite or facet scores were developed by performing a factor analysis within each of the Big Five item pools on the 1644 case sample. The following traditional facet titles were ascribed to the results of each of those analyses in Christal's Table 7.

Table 7

Titles and Cross-Validation of Sub-Composite Scores

SUBCOMPOSITE	# ITEMS	CORRELATION	MULT. CORR.
Agreeableness			
1. Warm and Sympathetic	6	.82	.96
2. Friendly	5	.83	.96
3. Considerate	5	.82	.96
4. Cold and Insensitive	5	.90	.98
5. Helpful	4	.79	.95
Conscientiousness			
1. Efficient and Dependable	10	.86	.99
2. Hard Working	8	.89	.99
3. Organized	8	.86	.99
Extroversion			
1. Shy and Bashful	10	.87	.99
2. Talkative	5	.84	.97
3. Socially Active	5	.80	.96
4. Assertive	4	.76	.94
5. Unsociable	5	.81	.96
Openness			
1. Philosophical	10	.85	.99
2. Scientific Interest	7	.87	.99
3. Creative	4	.80	.97
4. Reflective	5	.89	.97
5. Cultured	3	.80	.89
Neuroticism			
1. Nervous and Stressed Out	16	.85	.97
2. Worrying	8	.83	.94
3. Irritable	8	.88	.97
4. Envious and Jealous	5	.80	.89

Christal explored methods to operationalize the use of facets. Ruling out percentiles (which obscure the normal distribution of these values), he turned to T-scores as an appropriate approach. Christal's Table 8 below reports the means and standard deviations for the derived facets/subcomposites on a larger reference group (n=2853).

Standard Scores for Subcomposites

Means and standard deviations were computed for the subcomposite scores in the 2853-case sample so that they can be used in computing T-scores. These are documented in the Table 8 below:

Table 8

Means and Standard Deviations of Sub-Composite Scores

Variable	Mean	Std Dev	Factor Title
AGREE1	87.61	29.86	Warm and Sympathetic
AGREE2	65.26	27.55	Friendly
AGREE3	57.20	31.98	Considerate
AGREE4	-56.81	36.67	Cold and Insensitive
AGREE5	48.14	22.98	Helpful
CONSC1	131.65	46.26	Efficient and Dependable
CONSC2	102.92	41.24	Hard Working
CONSC3	80.92	53.09	Organized
EXTRO1	-39.01	89.04	Shy and Bashful
EXTRO2	35.09	37.75	Talkative
EXTRO3	36.04	40.62	Socially Active
EXTRO4	21.93	27.97	Assertive
EXTRO5	-48.68	39.78	Unsociable
OPEN1	72.25	68.33	Philosophical
OPEN2	21.72	55.83	Scientific Interest
OPEN3	43.23	28.16	Creative
OPEN4	16.72	39.93	Reflective
OPEN5	-5.00	27.42	Cultured
NEURO1	-98.27	115.89	Nervous and Stressed-Out
NEURO2	-23.39	65.40	Worrying
NEURO3	-24.15	63.61	Irritable
NEURO4	-31.62	41.18	Envious and Jealous

The Conversion to all Behavioral Statements

In creating the SDI+ the decision was made to convert all items into the behavioral statement format. This decision was made for several reasons. First, the standard "trait" rating used a different rating scale ("How characteristic is this trait of me…"). While a mixed rating scale increased the complexity of the original AFSDI, more significantly, the trait rating instructions included the qualification of "as compared to others of the same sex and general age." Although standard in personality research (which uses results in a "normative" fashion), this qualification was unacceptable in spirit with the Uniform Guidelines for Employee Selection Procedures. Behavioral statements used no such qualification in its rating scale. Second, this change would simplify administration instructions when used with the Air Force Officer Qualifying Test (AFOQT) which is operationally administered in over 450 locations worldwide. Third, the statement format gave more clues to meaning for respondents with lower reading skills or with the issue of "English as a second language."

The Original AFSDI Items Mapped into the SDI+

While the confirmatory factor analysis demonstrated that the original Big Five Factors were still captured, it was desirable to have a professional human inspection made to assess an item by item match quality. The AFSDI contained 163 (64 Trait plus 99 Behavioral Statement) items. The SDI+ contains 220 items. This put the number of possible comparisons at 35,860 – very daunting for a human to evaluate. Computer software from previous research projects (Semantic-assisted Analysis Techniques – SAAT, Driskill et al, 1995) was used to provide an automated cross-matching between the two lists providing potential matches (possibly many-to-one) with quality estimates of those match options.

Dr Rita Hilton in Dr Lisa Mills' office (AF/A1PF) provided the professional review of these suggested matches along with deeper semantic evaluations. Table 2 below summarizes the result of this analysis.

Table 2: Mapping of SDI Items into the SDI+

Match Quality from AFSDI (n=163)	Number of Items	%-of SDI+ Inventory (n=220)	Match Category	Category %-of SDI+ Inventory
No Match Found	69	31.4%	None	31.4%
Negative Valence with Qualification	2	0.9%	Low	
Same Emotional Ballpark	17	7.7%	Low	8.6%
Close but Heavily Compounded	33	15.0%	Medium	
Close, Non-Trivial Qualifications	35	15.9%	Medium	30.9%
Direct Inverse or Negative Valence	3	1.4%	High	
Minor Qualifications	47	21.4%	High	
Exact Match	14	6.4%	High	29.1%

With the AFSDI only containing 163 items and 220 items in the SDI+, the minimum non-match level is: (220-163)/220 or 25.9%. The observed 31.4% (n=69) for non-matching items is not surprising given that two additional synthetic factors (63 items) have been added to the SDI+. This match process only counted one-to-one mappings. Hence, where there might have been a trait-to-behavioral statement item redundancy in the original AFSDI, the SDI+ (with only behavioral statements) could only identify at most one match instead of two.

While this level of item matching is reassuring, actual item-level integrity is not essential. The important issues are the measurement stability of the overall instrument and its ability to document the Big Five structure when properly analyzed.

SDI+ Mapped Into Air Force Core Values

Over fifteen years of professional journal articles and two new synthetic factors ("Service Orientation" and "Team Orientation") were new to the SDI+ since the subcomposites (facets) were suggested for Christal's original AFSDI in 1993. The original AFSDI with its 22 facets was constructed using professional judgment and validated using stringent mathematical procedures. The SDI+, however, built upon that foundation and expanded both factors and items to support the constructs in the Air Force Core Values. To validate the SDI+, rather than starting from scratch and conducting an exploratory factor analysis, a hierarchical confirmatory factor analysis was conducted to ensure that the allocation of items was appropriate and, as a whole, still presented the Big Five with proper clarity.

The identification and labeling of facets for the SDI+ was accomplished with less emphasis on rigor and more emphasis on operational relevance to understanding how an individual would fare in the Air Force. In other words, facets were labeled to reflect (either positively or negatively) items which capture a person's 1) trustworthiness (integrity and wingmanship), 2) propensity to keep mission requirement above any personal issues (service before self), 3) commitment to technical excellence, and 4) flexibility to adapt to new and expanding missions. Using these themes, a few minor adjustments were made to the facet titles proposed by the VAnalytic contractor (such as "Integrity" in place of "Morality"). These final facet descriptions were then mapped into this expanded Air Force Core Values Paradigm using the four concepts noted above.

Note that the fourth category ("Flexibility for Emerging Missions") is <u>not</u> being proposed to expand the doctrine of Air Force Core Values. Rather, this fourth category is reported just to account for 100% of the items in the SDI+ instrument.

At the highest level, the new SDI+ covers the expanded Core Values Paradigm as shown below in Table 3.

Table 3: Summary of SDI+ Items Mapped to Air Force Core Values

Expanded Air Force Core Value Paradigm Area	Number of Items (Total = 220)	Percent of SDI+ Items (Approximate)
Integrity (with Wingmanship)	87	40%
Service Before Self	64	30%
Excellence in All We Do	44	20%
Flexibility for Emerging Missions	25	10%

Using this 4-category model, Table 4 presents the final SDI+ facets organized under the Air Force Core Values.

Table 4. 19 SDI+ Facets Listed Under the Air Force Core Values Paradigm

Core Value	Facet Description	Number of Items (Total n=220)	% of SDI+
Integrity (and Wingmanship)		87	39.5%
	Integrity	17	
	Altruism	17	
	Gregariousness	23	
	Friendliness	11	
	Assertiveness	9	
	Sympathy	6	
	Cooperation	4	
Service Before Self		64	29.1%
	Service	11	
	Emotionality	19	
	Self-Efficacy	11	
	Anxiety	9	
	Depression	8	
	Self-Consciousness	6	
Excellence in All We Do		44	20.0%
	Excellence	20	
	Orderliness	10	
	Achievement Striving	9	
	Action-Oriented	5	
Flexibility for Emerging Missions		25	11.4%
	Intellect	15	
	Imagination	10	

As Christal noted, no value has been demonstrated for facet-level descriptions. This facet level description was generated to allow comparison with comparable descriptions in the professional literature. The majority of these facet descriptions were created before mapping into "Air Force Core Values" was envisioned as a goal. Once this goal was identified, the four operational interpretations of the Core Values were generated. Following the new operational paradigm, three facets were renamed (Integrity=Morality, Service=Team Orientation and Excellence= Self-Discipline).

SDI+ and Real Personnel Decision Making

Officer Candidates and the AFOQT

When the Air Force Research Laboratory (AFRL) was launched in FY 99 (Oct 1998), it combined several former Air Force Laboratories. The focus of the new AFRL was on high technology and embedded warfighters. One former laboratory was not incorporated into the new AFRL mission -- the Air Force Human Resources Laboratory (AFHRL) with the historical mission of "general personnel research." With this change the 40-year AFSDI research stream (1958-1998) ceased operation along with its organization support element -- the Learning Abilities Measurement Program (Project LAMP).

Christal's AFSDI was validated on officer (US and UK) as well as enlisted populations. When it became time to replace the Air Force Officer Qualifying Test (AFOQT) in 1999, there was no AFHRL to perform this work and so this work was contracted out. Many of the former senior AFHRL researchers had retired when that lab closed and they were available, under contract, to construct a new AFOQT. The Air Force contract specified that the AFSDI be reworked and incorporated into the new AFOQT (Form "S").

AFOQT Form "S" – The New Standard

The SDI+ became operational as Part 12 of the Air Force Officer Qualifying Test (AFOQT) on 1 August 2005. The AFOQT master file now contains over 30,000 records which form the basis for most of the current analysis. No operational personnel decisions are currently being made using this SDI+ data. The SDI+ data are not released outside of the Air Force Test Processing Unit except for statistical analyses -- with identities removed.

The AFOQT is a standard, rigorous test instrument with one norming reference group. Composite scores (Pilot, Navigator, Academic, Verbal, and Quantitative) are reported as percentile standing in the norming sample. Regardless of accession source, there is mandate that anyone who is scheduled for attendance at the Air Education and Training Command's (AETC's) pilot or navigator schools must have the AFOQT scores "on file" (They also require scores for the Air Force psychomotor test known as the "Test of Basic Aviation Skills",TBAS).

Beyond that mandate, the AFOQT is used differently by each of the Air Force Officer Accession sources. In terms of the number of officers candiadates each year the major officer accession sources include the Reserve Officer Training Corps (ROTC), the United States Air Force Academy (USAFA), and the Officer Training School (OTS). Each of these accession sources taps a different underlying population, tests them at differing points in their academic program, and uses the scores for different, intra-program decision making. These accession source differences need to be acknowledged and controlled in every analysis of either cognitive (academic) or non-cognitive (SDI+) sections of the AFOQT.

AFOQT Usage by Air Force Accession Source: ROTC

Generally speaking, the ROTC accession source uses the AFOQT at possibly two points in their 4-year program. ROTC will administer the AFOQT to High School graduates to qualify them for a potential 4-year civilian college scholarship. To secure a scholarship, applicants must meet minimum qualifying scores on the Verbal (15) and Quantitative (10) composites – this ensures they meet commissioning requirements. Typically these students will be 17-18 years old with no college work – however, because of focused recruiter actions – tends to be more technical and mathematically inclined. Drawing from civilian college applicants/students, this is the least restrictive accession source and represents the major source for diversity in terms of ability and minority status (by race and gender.) In other words, these groups include "cherry-picked" technically qualified individuals but have the least benefit from college at the time they are tested.

The ROTC accession source also grants 2-year scholarships for the last two years of college. ROTC also allows currently enrolled students to retake the AFOQT in order to obtain the higher AFOQT test scores required to qualify for pilot and navigator jobs. These people, in recent years, tend to be a mixture of less technical (the two-scholarship applicants) and people who previously had lower test scores on the pilot and navigator portions of the AFOQT (and hence voluntarily re-tested). Typically these students are 19-20 years old with two years of college completed.

AFOQT Usage by Air Force Accession Source: OTS

The OTS accession source is only open to applicants who have successfully completed their 4-year college degree program. These people have demonstrated their determination, maturity and ability to complete degree program requirements. These people are generally ages 22 and up and many have probably lived away from home for four years. Each year there are very few of these openings as compared to ROTC and hence there is fierce competition which is strongly based on AFOQT scores. This tends to be an older, more mature and very selective (high AFOQT with restricted range) group with the benefit of four years of college.

As a statistical note in interpreting "group averages:" For minorities any score averages will be driven by their much larger portions in the ROTC populations which, for the most part, are 4-years younger and have no college at the time of testing on the AFOQT.

AFOQT Usage by Air Force Accession Source: USAFA

The US Air Force Academy represents a more complex, mixed model of those described above. Because of their stringent nomination and selection procedures, the AFOQT scores are not part of any of the Air Force Academy's routine screening or placement processes. Serving as a high specialized four-year college program, cadets, depending on their class could be anywhere between the ages of 17 and 22. By the time they graduate,

cadets will have studied all the subjects covered by AFOQT. For this reason, Academy cadets at various year-points often serve as the "golden yardstick" in norming samples used to validate new forms of the AFOQT.

Traditionally there was no mandate for Academy cadets to take the AFOQT unless they were headed to AETC pilot or navigator training. Because assignment to pilot and navigator training was determined by their third year at the Academy the Air Force was only sampling "the best of the best." Academy cadet scores have always been vastly superior to all other sources and provide the perfect sample to verify scoring keys and the validity of emerging forms of the AFOQT.

In coordinating the release of the AFOQT Form "S", an AFPC-AFRL courtesy visit was made to the Academy in August 2005. AFPC had been hearing requests from AETC to develop new AFOQT composites (like the Pilot and Navigator composites) to be used for screening candidates into other highly technical AETC officer training programs. To prepare for this eventuality, it was recommended that Academy begin testing all cadets, not just those scheduled for pilot and navigator training. On 24 September 2008 a new version of the Air Force Military Personnel Testing Program Air Force Instruction (AFI 36-2605) was released which, in §1.9, now specifies that all Air Force Academy cadets will take the AFOQT – and hence, the SDI+.

SDI+ Stand Alone Delivery Formats: Paper, Computer & Web

During the meeting, Academy representatives expressed interest in using the SDI+ upon entering the Academy for possible counseling purposes. At that point in time, the only serviceable version of the SDI+ was embedded in the full AFOQT instrument. Because incoming Academy Cadets are recent high school graduates, if they were to take the full AFOQT upon entrance, this would count as one their two career opportunities to take the AFOQT. Also, even though the Academy is admitting only the most highly qualified applicants, these "early" scores would reflect their level before benefit of any of the Academy's extraordinarily relevant curriculum.

AFPC was asked about the possibility of developing a stand alone SDI+ instrument. Since these Academy discussions a stand alone hardcopy SDI+ booklet version has been deployed. A computer-based (but without Internet access) SDI+ data collection tool has been developed by the Federal Aviation Administration (FAA) under a joint project with the Air Force for the selection of Air Traffic Controllers. A new project is starting next week to quickly deploy a web-based SDI+ data collection capability.

The Enlisted Force & the SDI+ Stand Alone Instruments

The original motivation behind the development of the SDI was to improve person-job match (initial classification) for the enlisted force – where billions are spent annually in initial skills training. Without Project LAMP, no work progressed on the SDI instrument. Occasional projects explored "personality" when related to the AFRL mission of the embedded warfighter including pilots, navigators, command and control personnel, air traffic controllers, and combat controllers.

Without a centralized Air Force personnel research laboratory for the past ten years, a number of these career field problems have been recognized usually manifesting as rising levels of attrition in either the training pipeline or in early job assignments. The problems are not likely to improve on their own given the continuing stressors of today's high ops tempo environment and a changing Air Force.

Not unexpectedly, many of these career fields are already in the process of working specialized solutions. Some career fields are using external contracts, others are using existing pockets of Air Force research capabilities and still others are being worked by service members in graduate programs who have initiated applied "research" data collections. As an alternative to a growing collection of specially designed instruments, interest in the SDI+ for generalized enlisted selection purposes has resurfaced. The near term goal of this initiative is to partner with these ongoing efforts and draw "unique" solutions into a pattern that provides an Air Force wide strategy for addressing various classes of problems. These opportunities are actively being pursued as well as data-mining historical archives as elaborated below.

SDI+ Work-In-Progress

The newly deployed SDI+ Booklet system has been shipped to several on-going projects to become part of their data collection operations. The enlisted Space Operations AFSC (1C6X1) has sent 75 operators to the Air Force Academy for one-day testing on both the stand alone SDI+ booklet and the computerized Test of Basic Aviation Skills (TBAS). These two tests form the backbone of our intended baseline assessment battery. This Space Operations project is a JCA-like effort to develop an effective screening tool for this one job family. As noted earlier in the JCA section, having a proven screening tool and being able to deploy it within existing personnel systems is sometimes problematic.

The Applied Performance Assessment & Testing Facility (APAT)

As part of an Air Force-wide approach, an Applied Performance Assessment and Testing (APAT) facility is currently being established at Lackland AFB. Lackland is the single Basic Training base for the United States Air Force and all new recruits flow through this location. Negotiations are under way to bring newly graduated basic trainees through this facility to be assessed using the SDI+ and the TBAS as an initial battery for screening many AFSCs – and eventually as a basis for future recruiting and career counseling tools.

AFOSR Retention Research (1998-1999 AFSDI Data)

The long-term success of using temperament assessments for person-job match depends on demonstrating several key facts. One of these facts is whether or not these temperament constellations are stable long enough in order to be useful not only for initial job placement, but ultimately long enough to predict retention decisions 4 or 6 or 16 years later. Those kinds of data takes a long time to collect, store and analyze. Today's Air Force managers are not going to wait 10 years for that evidence. Fortunately, data from 3,000 cases who took Project LAMP's AFSDI instrument are still available from the 1998-1999 timeframe. These people can be tracked through one or two reenlistment decisions. At present monthly personnel records have been pulled for these people and are awaiting analysis. While a basic yes/no on reenlistment decisions is all that is being pursued, these files contain monthly career field information and can show job change history, promotion test scores and the rate of paygrade increases.

Using the AFSDI-to-SDI+ Linkage

This is a three-year effort to document the value of the Project LAMP initiatives which were originally funded by the Air Force Office of Scientific Research (AFOSR). While the data exist only for the AFSDI form, with the AFSDI-to-SDI+ linkage work, it should be possible to roughly estimate how the SDI+ should work in retention predictions.

Using the Web-Based SDI+ Data Collection Tool

With the Web-Based SDI+ data collection tool now under development, for those people in the AFSDI 3,000 case sample still on active duty, it is be possible to locate them electronically and "resurvey" them using the new SDI+ and assess stability over a decade timeframe. At the same time, indicators of "long-term" service commitment can be examined.

SDI+ Beyond the "More is Better" Paradigm

Another question of fact is "Can we identify successful item constellations within operational Air Force job types?" This is a fundamental measurements problem at the core of this issue. The authors here suggest that the traditional approach to scoring in temperament instruments is an inappropriate for successful person-job-match.

Issue 1: A-Priori Interjection of Value Judgments.

This measurement problem begins with the assignment of "point values" and "valences" to temperament items. As delivered, both the JCA and the SDI+ used a standard 5-point Likert scale for each item. Responses range from "A=Strongly Disagree" through

"C=Neither Agree/Disagree" to "E=Strongly Agree." Take an example item like "I have never stolen anything from the office –even inadvertently like pens or paper clips" Assume this item has a "positive" valence – in other words, it was deemed as an indicator of a "good" personality. In other words, items are characterized in terms of their generally accepted social desirability quality. Because this item is deemed as "good," it is assigned a positive valence. In this case, a subject's response of "E" (Strongly Agree) would yield a +5-point score for the item. Another subject's response of "A" (Strongly Disagree) would yield a +1 (minimal) score for not accepting a "good" item. All points in between would be allocated points accordingly, B=2, C=3, D=4. Conversely, if an item with a negative value were presented (say "Stealing is ok if you don't get caught.") then the point values would reverse, allocating a 5 for an "A" and a minimal 1 for an "E."

The interjection of a-priori value judgments rewards subjects who look for the socially desirable response and pick it – staying with either "A" or "E" responses depending on the item valence. Moreover, as the purpose of the SDI+ is to make differential classification decisions, a single spectrum measure of "poor personality" to "good personality" is of little utility. If the intended usage of the SDI+ was for SELECTION (i.e. Go/No Go) determinations, a single dimension "quality" score would be appropriate.

Issue 2: Single Items are represented by Single Scores

The SDI+ was designed to reflect the Big Five factors of personality – of "normal" personalities. The SDI+ is not a diagnostic tool to identify defects. The underlying assumption, based on fifty years of selection, classification, and training research, is that the best temperament for any given job is not fully captured based on ability measures. Current aptitude or ability measures, although broken out by several composites, have strong ties back to general intelligence (or Spearman "g") which is probably the single strongest predictor of training success. Differential performance on various subtests of the Armed Services Vocational Aptitude Battery (ASVAB) reflect on both the applicant's general intelligence and on those specific domains (electronics, auto-shop, academic, etc) where the applicant chose to focus his or her attention in the years leading up to taking this DoD test. The goal of the SDI+ for classification purposes is to add differential information "on top" the existing predictive power of the ASVAB

When used for differential classification each possible response option (i.e. the "A" through "E" bubbles) represents a unique measurement opportunity. The information value of the item is not polytomous, i.e. is not validly reflected by a single score with option ratios of 1:2:3:4:5 (regardless of item valence.) Each of the 5 choices (A-E) for each item represents a possible behavior in response to a given stimuli (SDI+ statement). The most effective differential weighting between a "5" and "4" in making a classification decision may be very important. The "4" may, in fact, be the most telling response where "5" is simply a less than honest "socially acceptable" extreme. Consider the first example item above about "stealing office supplies." To say that you've NEVER walked off with something accidentally is less than honest – while a "4" may indicate a more realistic sense of concern for private property.

From 220 to 1320 SDI+ Dichotomized Responses

This kind of analysis at the response option level is not possible where every item is reduced down to a single score. In the currently ongoing analysis on the 220-item SDI+ , each item's responses are split out into 6 possible (yes/no or 1,0) dichotomous responses. In this way, no a-priori value judgment is interjected for any of the five active responses (A-E) or the sixth option – a non-response.

Identifying Major & Minor Constellation Types

The next step in this analysis is to perform a hierarchical clustering using this 1320-item (1, 0) response pattern. This clustering will uncover the major "personality" types and the not-so-common response patterns. Past failures to demonstrate the value of temperament in predicting "job success" have resulted from the incorrect assumption that everyone responds the same to the same external environment. Many studies show that this assumption is false. Of concern for this SDI+ effort, Maslow has shown, with his Hierarchy of Needs, that even the same person in the same situation will act differently based on his or her current level of self-actualization.

Rather than capitulating on this effort because of its complexity, the more appropriate approach is to compartmentalize that complexity. This approach is the way in which nature handles complex systems and, with the use of taxonomies, how scientists, sub-divide populations where several conflicting rules seem to co-exist. Inspecting the job satisfaction within and between these clusters and Air Force jobs will help illuminate the dynamics and predictive value of any particular response to discriminate future job satisfaction.

Issue 3: Stability of Temperament Across Time

Even though there is evidence to suggest that basic personality seems to be stable over time, the stability of temperament measures over time is an issue to be addressed. Again, as a measurements issue, how does one create a "score key" for each Air Force job? The use of socially desirable scoring keys created by psychologists and job analysts is doomed to failure and quick compromise. The reason that the SDI+ presents a uniquely military solution (for the enlisted corps at least) is that recruits sign up for 4- or 6- year enlistments. At the end of those enlistment contracts both the person and the Air Force have to "agree" to continued employment.

Historical occupational analysis studies (Christal, 1973, Gould, 1972 & 1976), have shown how job satisfaction changes with Time-in-Service. Although the pattern varies from career field to career field, there is one noticeable effect: the job satisfaction jumps following the first enlistment (in the 49th month for those with a 48-month contract). This effect is entirely expected as those in the 49th month are only those people who wanted to come back and who the Air Force deemed valuable enough to retain on active

duty – even if that meant changing job families to meet Air Force needs. The analytical approach is known as "information decision making" where response choices are evaluated individually in their ability to make correct classifications. In this case, the "correct classification" is a proper match between the SDI+ responses from general population of American youth, and specific Air Force jobs.

Elements of the Big Five and SDI+ are expected to hold up in predicting fifty plus months into the future and prove this whole process worth while. This is to be demonstrated and the AFOSR project is a giant leap in that direction. Using the "satisfied customer" SDI+ constellations from reenlisting members as a "scoring key" for each Air Force job-type is only a starting point. As this data matures, it is expected that the volatile and stable elements of temperament constellations will become apparent – and perhaps more predictable – with potentially improving results.

Hence, if entry-level aptitude measures from the ASVAB can do a reasonable job of predicting success in training, perhaps soliciting job satisfaction (and SDI+ responses) from recently reenlisting members can bolster predictions of first-term success. This information, then, would serve as the virtual mentoring from the current force to the population of American youth who may (or may not yet) be considering the military as a career in which they personally may find high job satisfaction.

Conclusion

The AFPC Force Management Liaison Office (FMLO) Outreach

Since being established 15 August 2007, the AFPC Force Management Liaison Office (AFPC/DPSF) has worked with Dr Lisa Mills of the Force Management Policy Division at Air Staff (HQ AF/A1PF) to address emerging force management issues (recruiting, selection, classification, promotion, utilization, and retention). Part of this mission, as documented in the recently released Air Force Instruction (AFI 36-2605) §1.6.2 (24 Sep 2008), is to interact with functional communities to identify opportunities for improvements in force management areas. To this end, AFPC/DPSF has initiated a comprehensive spreadsheet integrating training pipelines, attrition rates, training costs, and first-term retention rates. Based on prioritizing the comprehensive list, AFPC/DPSF has contacted career field managers and other concerned Air Force managers regarding "high payoff" pilot projects.

Ultimately, the goal is to improve person-job match as early in the personnel life-cycle process as is practical. Recent work on related projects has made it clear that the complexities in today's Air Force personnel and data systems combine to make fundamental change very challenging – but very much worth the effort.

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Headquarters Air Force Personnel Center

Integrity - Service - Excellence

Person-Job Match – Beyond the "More is Better" Paradigm

Johnny J. Weissmuller,
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Force Mgt Liaison Office

Overview: Objectives for Today's Presentation

- High-Level Summary of the Boring 31-page paper (read on the web site)
- Overview of the Big Five Factor Model of Personality and the USAF Self-Description Inventory (SDI+)
- The Vision for Deploying the SDI+
- Results to Date of SDI+ Validation
- Plans for Future Work including Issues in Person-Job Matching

Overview of "The Paper"

TABLE OF CONTENTS

The "Big Five" History

Using state-of-the-art electronic data processing equipment, in 1957 USAF performs factor analytic meta analysis of data sets from leading researchers under various conditions

Assigns Names to the recurrent "Big Five" factors which emerge under diverse conditions: OCEAN

Openness (Surgency)
Conscientiousness
Extraversion
Agreeableness
Neuroticism (Emotional Stability)

The “Big Five” History

- Late 1950’s US military services realize that they’ve captured all the available relevant variance in general intelligence (“g”) using current aptitude tests
- AF reviews the professional literature the world of personality measurement

Big Five History

- In May 1960, The US Navy sponsors a Tri-Service Conference on Selection to discuss THEORETICAL CONSIDERATIONS IN THE DEVELOPMENT AND USE A NON-COGNITIVE BATTERY
- All the US services (including USAF Tupes) present some findings and plans for future research

Big Five History

In the Air Force, at least, we have reached the point of diminishing returns from routine test development and systematic validation against training criteria… This becomes apparent when one stands back and looks at the progress we have made as a result of research conducted during the last twelve to eighteen years. **(Christal, 1960).**

Aptitude tests are designed to measure what a man <u>can</u> do – they have nothing to say about what the man <u>will</u> do. A man's self-confidence, his carefulness, his persistence in spite of boredom, his decisiveness, his creativity, and many other personality characteristics will have an obvious effect on his eventual success in almost any field of endeavor. Tests of these characteristics – and, of course, many others – are badly needed to supplement the information we get from measures of intellectual capacities. **(Mullins, 1960).**

It is common knowledge that scales are more likely to be falsified either consciously or unconsciously when used for job selection than in either job classification or a counseling situation. The amount of faking probably depends on what the examinee has at stake in the situation. **(Zaccaria, Borg, & McCollum, 1960).**

- **What happened? --- nothing**

Big Five History

- Evolving External Social Climate Pre-empts deployment options
- The “Big Five” Model is researched and commercialized in the private sector (1960-1980). Goes public domain & non-profit also
- 1979 - Concern Arises that with growing cultural diversity and increased complexity in Air Force jobs, ASVAB needs augmentation

2,413 Items as of 1 Oct 2008

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The international personality item pool and the future of public-domain personality measures ☆

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Available online 25 October 2005

What is the Big Five Model? (Openness)

Johnny's Big Five Profile – 2007 IMTA Timeframe

```
Domain/Facet..... Score 0---------10---------20---------30---------40---------50---------60---------70---------80---------90---------99

OPENNESS TO EXPERIENCE.....58 ************************************************************

..Imagination.............95 ********************************************************************************************************

..Artistic Interests.......16 ****************

..Emotionality.............4 ****

..Adventurousness..........89 ********************************************************************************************

..Intellect................91 **********************************************************************************************

..Liberalism...............23 ************************
```

http://test.personality-project.org/

What is the Big Five Model? (Conscientiousness)

Johnny's Big Five Profile – 2007 IMTA Timeframe

```
Domain/Facet..... Score 0---------10---------20---------30---------40---------50---------60---------70---------80---------90---------99

CONSCIENTIOUSNESS.....79 ********************************************************************************

..Self-Efficacy.....89 ************************************************************************************************

..Orderliness.....47 **********************************************

..Dutifulness.....56 ******************************************************

..Achievement-Striving.....87 ********************************************************************************************

..Self-Discipline.....60 **********************************************************

..Cautiousness.....87 ********************************************************************************************
```

What is the Big Five Model? (Extraversion)

Johnny's Big Five Profile – 2007 IMTA Timeframe

```
Domain/Facet..... Score 0---------10--------20--------30--------40--------50--------60--------70--------80--------90--------99

EXTRAVERSION.............47 **********************************************

..Friendliness...........66 ****************************************************************

..Gregariousness.........18 ******************

..Assertiveness..........60 ************************************************************

..Activity Level.........93 ********************************************************************************************

..Excitement-Seeking.....0

..Cheerfulness...........67 *****************************************************************
```

What is the Big Five Model? (Agreeableness)

Johnny's Big Five Profile – 2007 IMTA Timeframe

```
Domain/Facet..... Score 0--------10--------20--------30--------40--------50--------60--------70--------80--------90--------99

AGREEABLENESS.....58 ************************************************************

..Trust.....75 ***************************************************************************

..Morality.....26 **************************

..Altruism.....66 ********************************************************************

..Cooperation.....90 ****************************************************************************************

..Modesty.....29 *****************************

..Sympathy.....36 ************************************
```

What is the Big Five Model? (Neuroticism)

Johnny's Big Five Profile – 2007 IMTA Timeframe

```
Domain/Facet..... Score 0---------10--------20--------30--------40--------50--------60--------70--------80--------90--------99

NEUROTICISM.................18 ******************

..Anxiety...................42 ******************************************

..Anger.....................1 *

..Depression................34 **********************************

..Self-Consciousness.......61 ************************************************************

..Immoderation..............19 *******************

..Vulnerability.............21 *********************
```

AFSDI Facets (1994)

SUBCOMPOSITE	# ITEMS	CORRELATION	MULT. CORR.
Agreeableness			
1. Warm and Sympathetic	6	.82	.96
2. Friendly	5	.83	.96
3. Considerate	5	.82	.96
4. Cold and Insensitive	5	.90	.98
5. Helpful	4	.79	.95
Conscientiousness			
1. Efficient and Dependable	10	.86	.99
2. Hard Working	8	.89	.99
3. Organized	8	.86	.99
Extroversion			
1. Shy and Bashful	10	.87	.99
2. Talkative	5	.84	.97
3. Socially Active	5	.80	.96
4. Assertive	4	.76	.94
5. Unsociable	5	.81	.96
Openness			
1. Philosophical	10	.85	.99
2. Scientific Interest	7	.87	.99
3. Creative	4	.80	.97
4. Reflective	5	.89	.97
5. Cultured	3	.80	.89
Neuroticism			
1. Nervous and Stressed Out	16	.85	.97
2. Worrying	8	.83	.94
3. Irritable	8	.88	.97
4. Envious and Jealous	5	.80	.89

AFSDI Linked to Job Performance

Table 5. Relationship of AFSDI composites and job performance dimension

Rating dimension	O	A	C	E	N
Technical Knowledge/Skill	.15	.29*	.18	.07	-.23
Initiative/Effort	.20	.39**	.11	.17	-.24*
Knowledge of and Adherence to Regulations/Orders	.26*	.35**	.07	.13	-.24*
Integrity	.27*	.36**	.20	.02	-.21
Leadership	.27*	.40**	.23	.13	-.34**
Military Appearance	.05	.27*	.14	.15	-.23
Self Development	.29*	.31**	.17	.20	-.33**
Self Control	.22	.26*	.06	-.13	-.17
Global 1: Technical Proficiency	.04	.33**	.16	.07	-.21
Global2: Interpersonal Proficiency	.35**	.47**	.20	.01	.24*

* p<.05 **p<.01 Collis (1996)

Christal's Lessons Learned

- Big Five was Stable Across Paper-and-Pencil Forms
- Big Five was Stable Across Media – after corrections

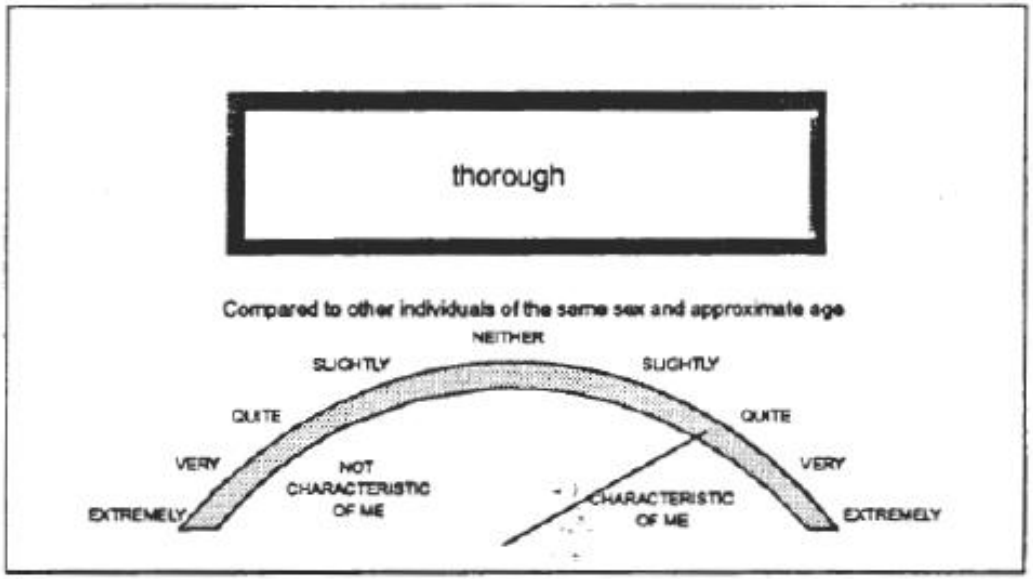


Figure 1. Rating Scale for Trait names

SDI+ Confirmatory Factor Analysis (2008)

- The SDI+ uses two new synthetic factors: “Service Orientation” and “Team Orientation”
- These scales “borrowed” items from other scales
- Hence, the overall parsimony of this factor structure was not ideal…

ITEM-LEVEL FACTOR ANALYSIS RESULTS:

Comparative Fit Index (CFI) = .75 (*IDEALLY, SHOULD BE .93 OR HIGHER)
Tucker Lewis Index (TLI) = .74 (*IDEALLY, SHOULD BE .95 OR HIGHER)
Root Mean Square Error of Approximation (RMSEA) = .03 (90% C.I. = .03 - .03) (EXCELLENT)
Standardized Root Mean Square Residual (SRMR) = .07 (EXCELLENT)

Confirmation of Item-Factor Linkage

Table 1: Item-within-Factor Standard Regression Weight Summaries

STDYx	Open	Consci	Extraver	Agree	Neurot	Service	Team
Min	0.161	0.094	0.103	0.375	0.257	-0.096	-0.083
Max	0.713	0.772	0.849	0.770	0.727	0.673	0.697
Mean	0.4412	0.5763	0.5395	0.6126	0.5802	0.3404	0.3191

Mapping Items into Taxonomies

- To ensure that the SDI+ could meet a full range of Air Force needs these new facets were aligned under the three Air Force Core Values: (See Slide Footer)

Expanded Air Force Core Value Paradigm Area	Number of Items (Total = 220)	Percent of SDI+ Items (Approximate)
Integrity (with Wingmanship)	87	40%
Service Before Self	64	30%
Excellence in All We Do	44	20%
Flexibility for Emerging Missions	25	10%

Air Force Core Value: Integrity

Core Value	Facet Description	Number of Items (Total n=220)	% of SDI+
Integrity (and Wingmanship)		**87**	**39.5%**
	Integrity	**17**	
	Altruism	**17**	
	Gregariousness	**23**	
	Friendliness	**11**	
	Assertiveness	**9**	
	Sympathy	**6**	
	Cooperation	**4**	

Air Force Core Value: Service Before Self

Core Value	Facet Description	Number of Items (Total n=220)	% of SDI+
Service Before Self		**64**	**29.1%**
	Service	**11**	
	Emotionality	**19**	
	Self-Efficacy	**11**	
	Anxiety	**9**	
	Depression	**8**	
	Self-Consciousness	**6**	

Air Force Core Value: Excellence in All We Do

Core Value	Facet Description	Number of Items (Total n=220)	% of SDI+
Excellence in All We Do		**44**	**20.0%**
	Excellence	**20**	
	Orderliness	**10**	
	Achievement Striving	**9**	
	Action-Oriented	**5**	

Air Force Core Value: (None) –
Flexibility for Changing AF Mission

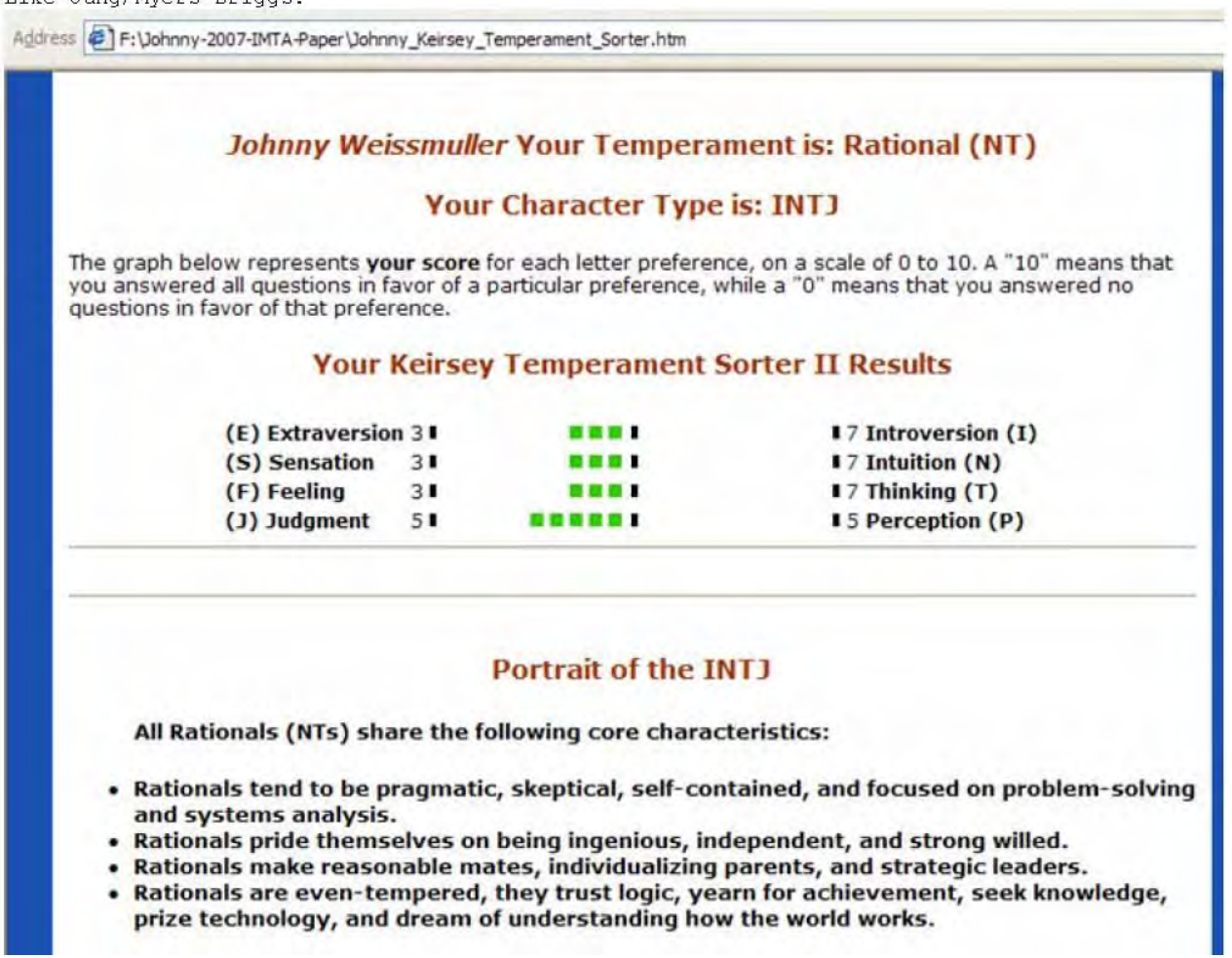
Core Value	Facet Description	Number of Items (Total n=220)	% of SDI+
Flexibility for Emerging Missions		**25**	**11.4%**
	Intellect	**15**	
	Imagination	**10**	

AFSDI Linked to SDI+

Match Quality from AFSDI (n=163)	Number of Items	%-of SDI+ Inventory (n=220)	Match Category	Category %-of SDI+ Inventory
No Match Found	69	31.4%	None	31.4%
Negative Valence with Qualification	2	0.9%	Low	
Same Emotional Ballpark	17	7.7%	Low	8.6%
Close but Heavily Compounded	33	15.0%	Medium	
Close, Non-Trivial Qualifications	35	15.9%	Medium	30.9%
Direct Inverse or Negative Valence	3	1.4%	High	
Minor Qualifications	47	21.4%	High	
Exact Match	14	6.4%	High	29.1%

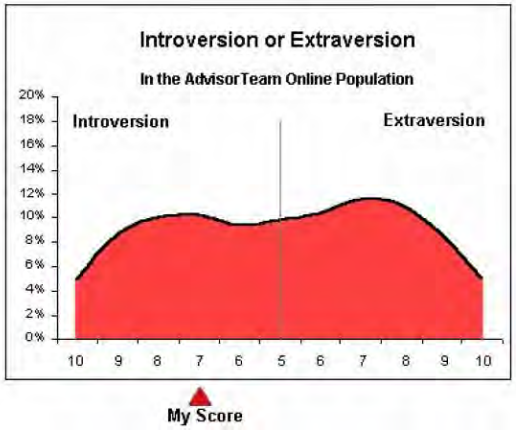
"Using" Personality Information –
The Keirsey Temperament Sorter

Like Jung/Myers-Briggs:

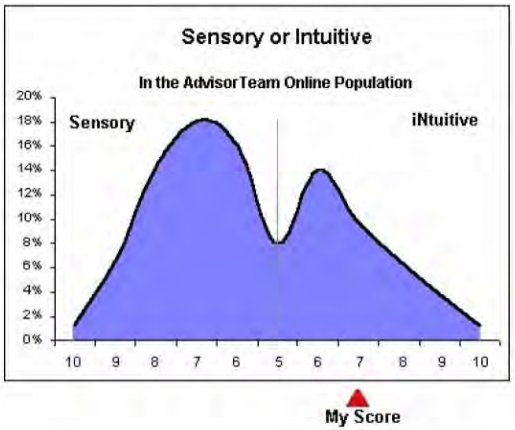


"Using" Personality Information –
The Keirsey Temperament Sorter

"I"

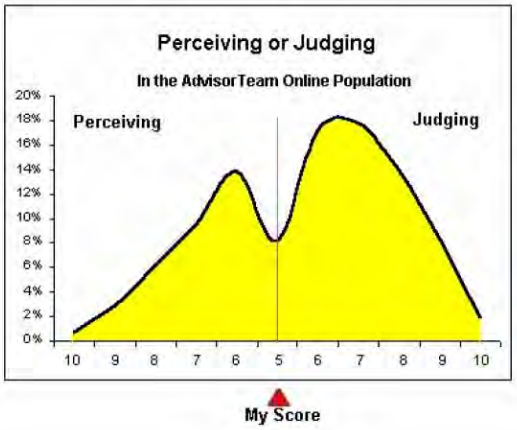


"N"



"T"

"J"



"Using" Personality Information –
The Keirsey Temperament Sorter

Career and Job Interests of the INTJ

In the fourth quarter of 2000, AdvisorTeam conducted a career satisfaction survey, polling over 5400 people on how happy they are in their career, with their company, and what drives them to be satisfied (or not) at work.

The Rationals (NTs)
Rationals tend to be about as satisfied (about 75%) as their intuitive counterparts, the Idealists. However, in contrast to the NFs, NTs seem to base a great deal of their satisfaction on being provided challenging work and flexible hours. Company-sponsored beer on Fridays, pets allowed in the workplace, and even potentially lucrative stock options did drive this group's satisfaction. Rationals tend to have a wide set of interests, and while they appreciate (and demand) a challenge at work, they also need to have time to "play"--the work they do outside of work.

Specific Career Choices of the INTJ:

- **management consultant**
- **economist**
- **scientist**
- **computer programmer**
- **environmental planner**
- **new business developer**
- **curriculum designer**
- **administrator**
- **mathematician**
- **psychologist**
- **neurologist**
- **biomedical researcher**
- **strategic planner**
- **civil engineer**
- **intellectual properties attorney**
- **designer**
- **editor/art director**
- **inventor**
- **information-graphics designer**
- **financial planner**
- **judge**

"Using" Personality Information –
The Keirsey Temperament Sorter

I've Highlighted Jobs I have held and enjoyed:

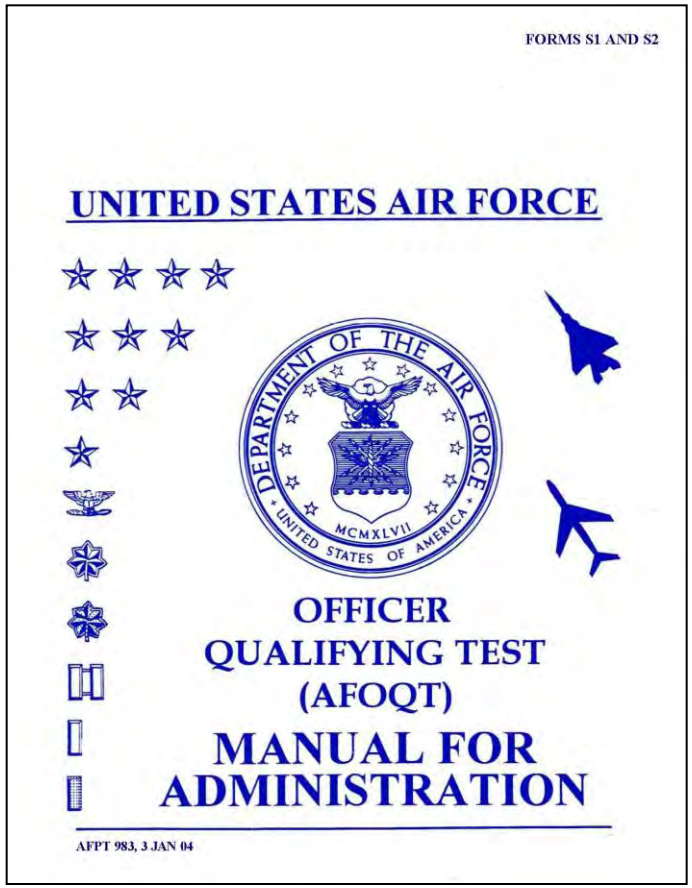
Specific Career Choices of the INTJ:

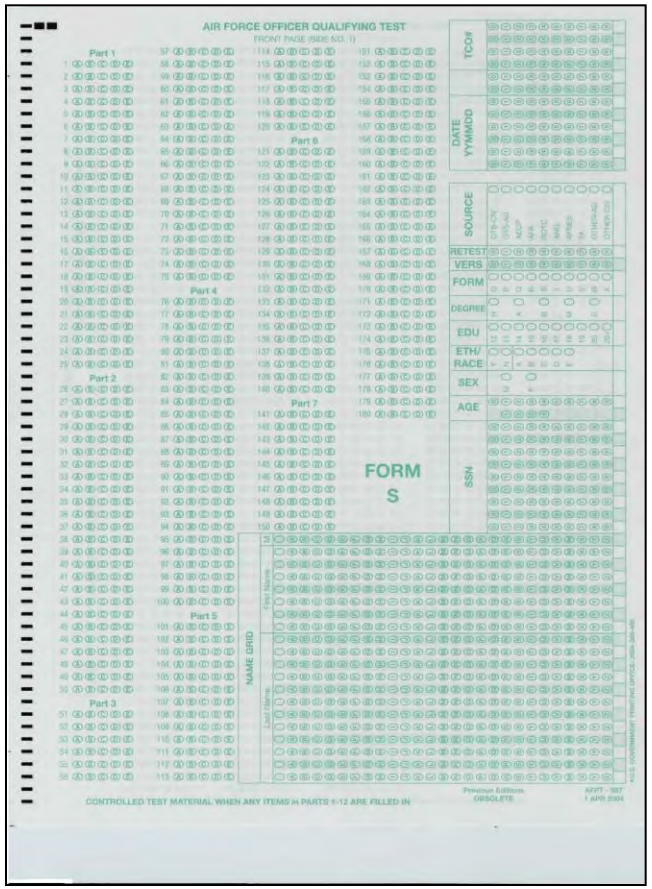
- management consultant
- economist
- scientist
- computer programmer
- environmental planner
- new business developer
- curriculum designer
- administrator
- mathematician
- psychologist
- neurologist
- biomedical researcher
- strategic planner
- civil engineer
- intellectual properties attorney
- designer
- editor/art director
- inventor
- information-graphics designer
- financial planner
- judge

Big Five History

- 1995-2004 A series of contracts to operationalize SDI+ - Big Five plus “Service” & “Team” orientations – Now OCEAN ST
- July 2005, SDI+ becomes Part 12 of USAF Officer Qualifying Test (now 30,000 on File)
- Aug 2007, the Air Force Personnel Center re-organizes and the Force Management Liaison Office (FMLO) is created.

Air Force Officer Qualifying Test
(AFOQT Form "S" – 1 Aug 2005)





Air Force Officer Qualifying Test (AFOQT Form "S" – 1 Aug 2005)

TESTING SCHEDULE*

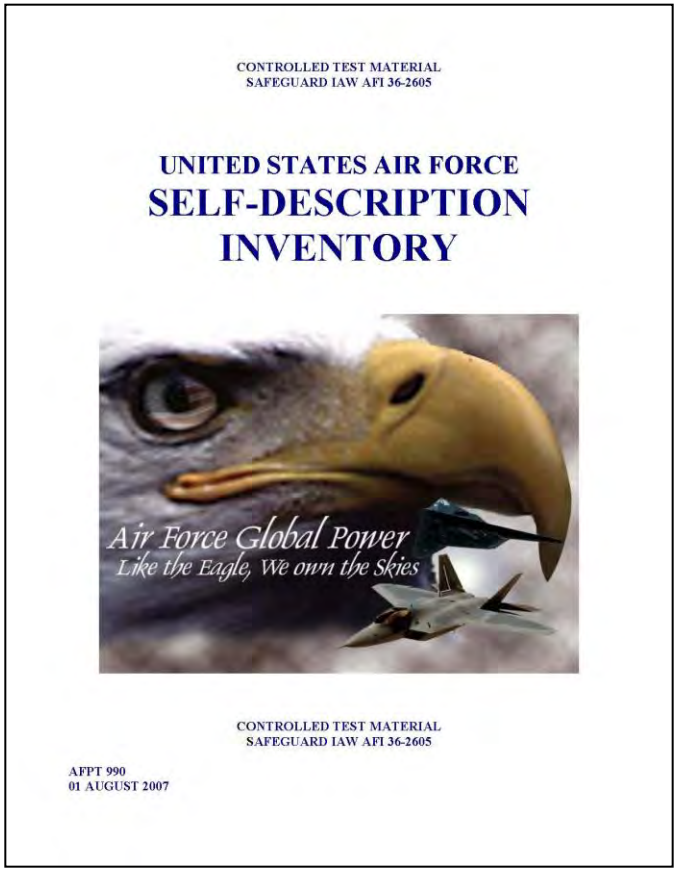
Test/Part Number	Subtest	Number of Items	Administration Time (in minutes)	Testing Time (in minutes)	Total Time (in minutes)
Pretest Activities			24		24
1	Verbal Analogies	25	1	8	9
2	Arithmetic Reasoning	25	1	29	30
3	Word Knowledge	25	1	5	6
4	Math Knowledge	25	1	22	23
5	Instrument Comp	20	3	6	9
6	Block Counting	20	2	3	5
Break			10		10
7	Table Reading	40	2	7	9
8	Aviation Information	20	1	8	9
9	General Science	20	1	10	11
10	Rotated Blocks	15	2	13	15
11	Hidden Figures	15	2	8	10
12	Self-Description Inventory	220	1	40	41
Collection of Materials			2		2
TOTAL TIME REQUIRED			**54 min**	**2 hrs 39 min**	**3 hrs 33 min**

*Times listed for pretest activities, general and subtest directions, and collection of materials are approximate.

Big Five History

- **Aug 2007, Stand Alone SDI+ Instrument Created for USAFA but used elsewhere**
- **Sep 2007, Separate Contracts Awarded to study the AFOQT and the Non-Cognitive SDI+**
- **Oct 2007, FMLO gets involved with the Job Compatibility Assessment (JCA) tool - A Big Five Based SCREENER for civilian jobs**

Stand Alone Self-Description Inventory Plus (SDI+)

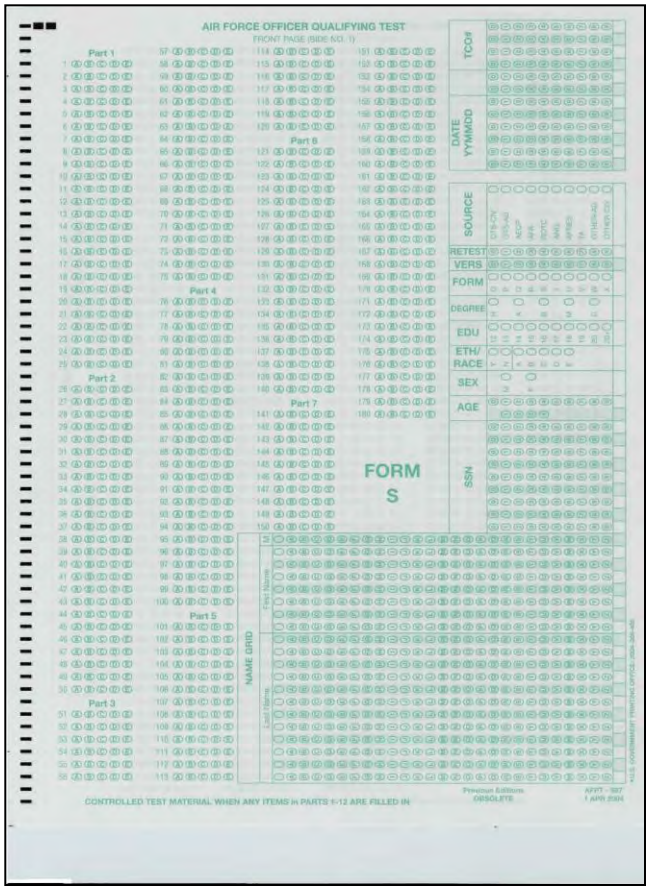


CONTROLLED TEST MATERIAL
SAFEGUARD IAW AFI 36-2605

UNITED STATES AIR FORCE
SELF-DESCRIPTION
INVENTORY

CONTROLLED TEST MATERIAL
SAFEGUARD IAW AFI 36-2605

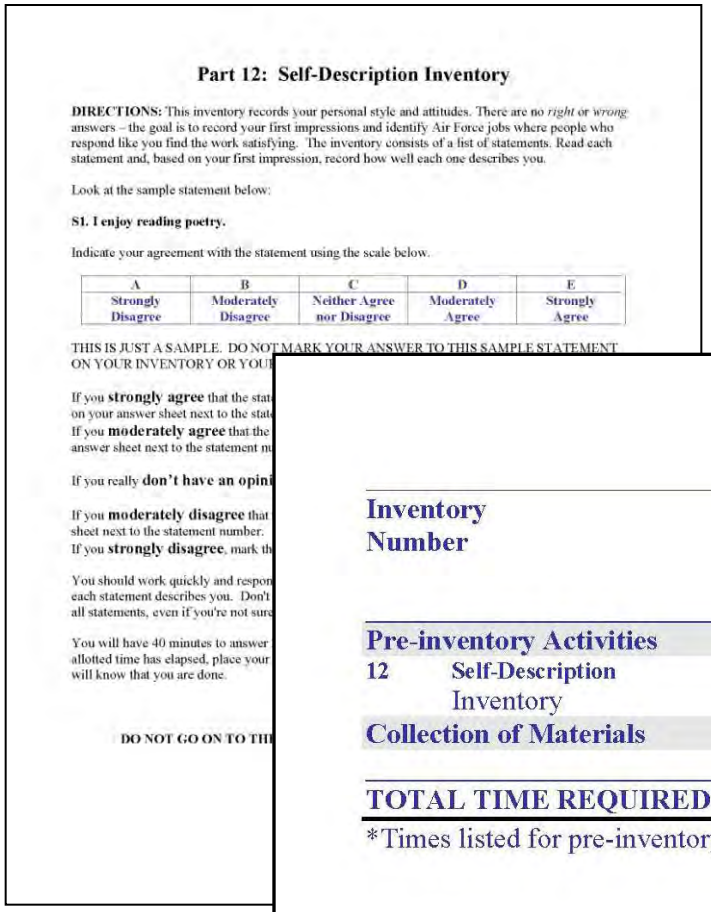
AFPT 990
01 AUGUST 2007



AIR FORCE OFFICER QUALIFYING TEST

FORM S

Stand Alone Self-Description Inventory Plus (SDI+)



Part 12: Self-Description Inventory

DIRECTIONS: This inventory records your personal style and attitudes. There are no *right* or *wrong* answers – the goal is to record your first impressions and identify Air Force jobs where people who respond like you find the work satisfying. The inventory consists of a list of statements. Read each statement and, based on your first impression, record how well each one describes you.

Look at the sample statement below:

S1. I enjoy reading poetry.

Indicate your agreement with the statement using the scale below.

A	B	C	D	E
Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree

THIS IS JUST A SAMPLE. DO NOT MARK YOUR ANSWER TO THIS SAMPLE STATEMENT ON YOUR INVENTORY OR YOU

If you **strongly agree** that the stat
on your answer sheet next to the stat
If you **moderately agree** that the
answer sheet next to the statement n

If you really **don't have an opini**

If you **moderately disagree** that
sheet next to the statement number.
If you **strongly disagree**, mark th

You should work quickly and respon
each statement describes you. Don't
all statements, even if you're not sur

You will have 40 minutes to answer
allotted time has elapsed, place your
will know that you are done.

DO NOT GO ON TO TH

SCHEDULE*

Inventory Number	Number of Items	Administration Time (in minutes)	Inventory Time (in minutes)	Total Time (in minutes)
Pre-inventory Activities		10		10
12 **Self-Description** Inventory	220	1	40	41
Collection of Materials		2		2
TOTAL TIME REQUIRED		**13 min**	**40 min**	**53 min**

*Times listed for pre-inventory activities, general directions, and collection of materials are approximate.

Big Five History

- Nov 2007, Plans launched for an Applied Performance Assessment & Testing (APAT) Facility
- March 2008, New SDI+ Factor Analysis Completed
- April 2008, Contract for APAT Proctor and 24 Computer Stations is approved
- Aug 2008, Physical Location for APAT Secured

Big Five History

Sep 2008, Results of Last Year's Contracts come back…

Oct 2008, New Contracts launched for:

Historical SDI Data Analysis (1997-1998)

Web-Based SDI+

Nov 2008, In-House Work Begins on moving beyond the "More is Better" Paradigm

Job Compatibility Assessment (JCA)

- Organization Objective: Mitigate Litigation Liability
- Screen people based on abnormal behavior which **may** be related to abnormal stresses on the job
- Anchor items in “Big Five” Personality paradigm
- See Malcolm Gladwell’s “BLINK”

JCA: Typical "How To"

- Develop a comprehensive instrument from IPIP items (say 300+ items)
- Administer to current workforce
- Identify items which differentiate "great" performers from "good" performers
- Project a stalking horse cut-score to address adverse impact
- Fine-tune and select interim <100 items

JCA: Typical "How To"

- For next two years, collect data using interim instrument for new applicants
- Validate interim instrument with real success (attrition & job performance)

JCA: Typical "How To"

- Adjust interim instrument content to better predict actual job performance/attrition
- Propose final instrument & cut-score
- Assess adverse impact with proposed "final" instrument & cut-scores
- Set final cut score and continue to track and monitor actual on-the-job performance

Job Compatibility Assessment

My Project Context:

New Civilians positions to work interchangeably with Military Security Forces (military police) personnel on bases within the continental US

New, emerging job requirements for “Continued Operations”

Job Compatibility Assessment

Constraints:

U.S. Civil Service, Office of Personnel Management (OPM) standard practices

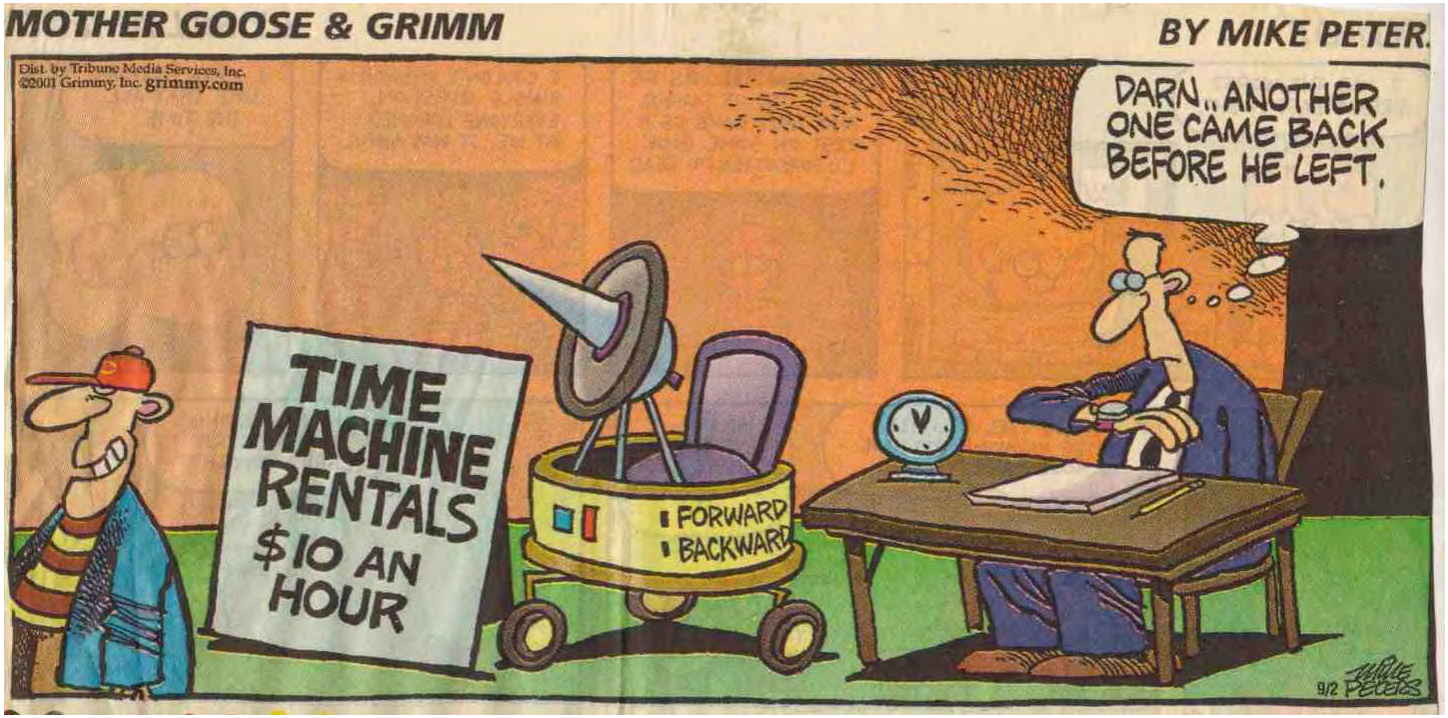
Low-Level, Non-supervisory GS Positions

Uniform Guidelines for Employee Selection

Americans with Disabilities Act (ADA)

Conclusion

- **Current Project is very challenging and breaking new ground. I am confident that, in time, new systems will emerge which address the legitimate concerns of all parties.**



Operational Demands & Critical Air Force Specialties & APAT

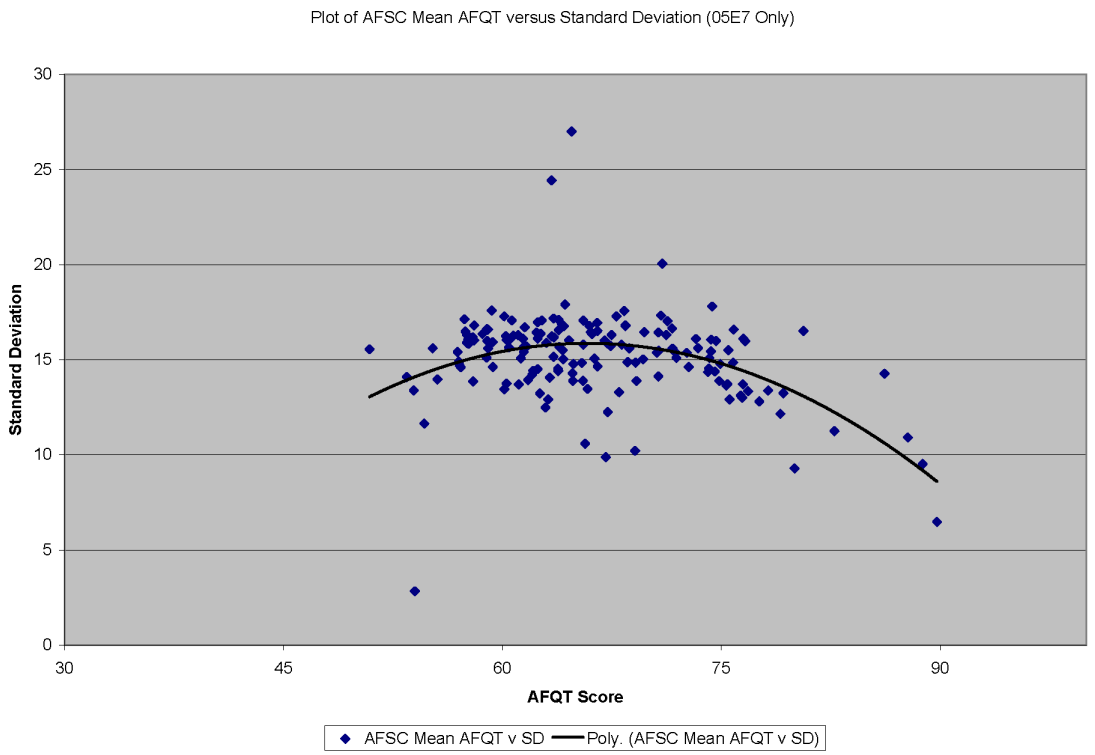
- 8 Enlisted Aircrew jobs
- Air Traffic Controllers
- Explosive Ordnance Disposal
- Aircraft Structural Maintenance
- Civilian-Military Security Police
- Cyber Command
- Space Systems

Challenges & Opportunities in Military Person-Job Match

- Challenges –
  - Occupational Titles Cover Broad Areas
  - The Military Pipeline – Chronological Implications
  - Current Workforce Stratified by Ability Levels

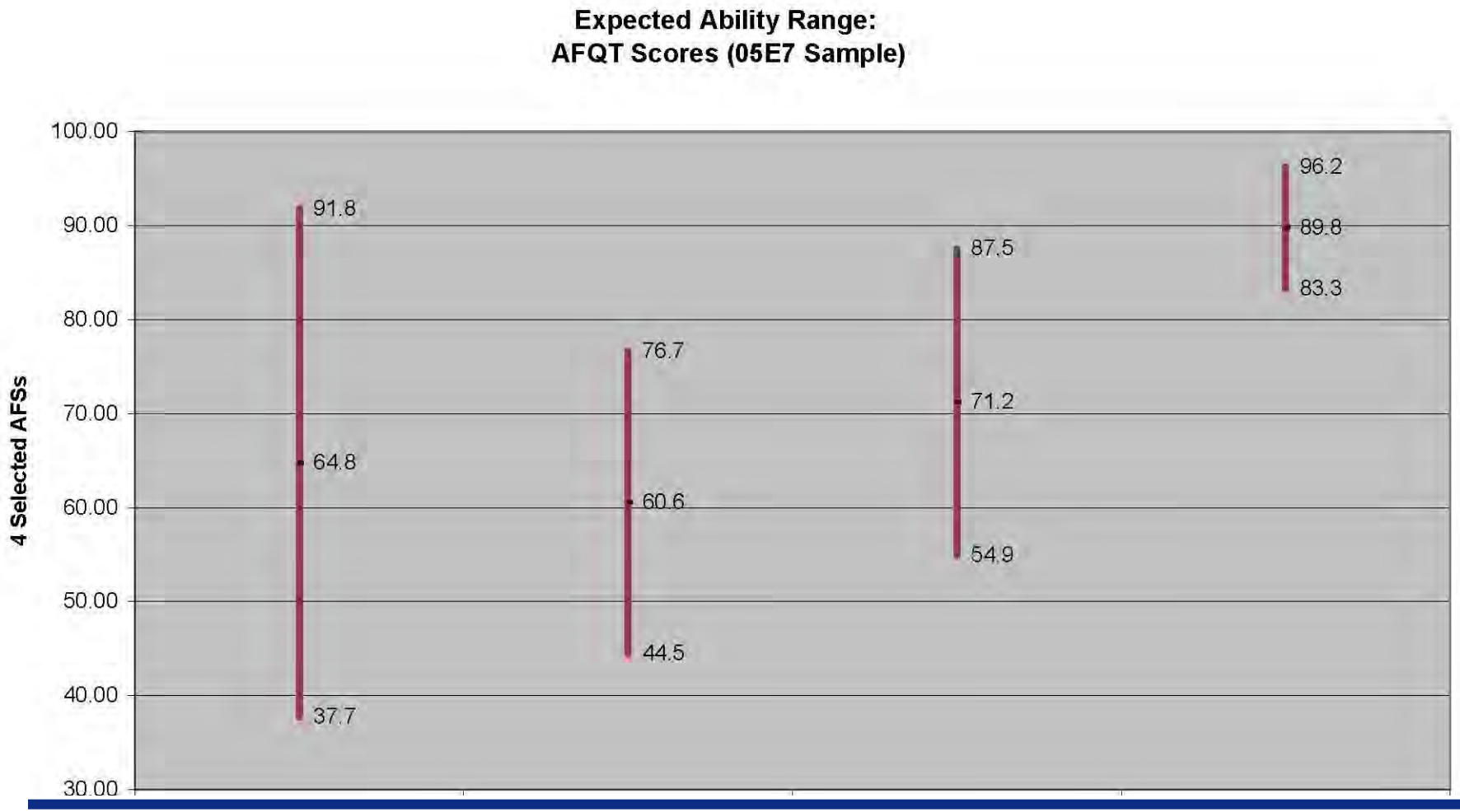
- Opportunities
  - Current Workforce was Assigned by Ability Alone
  - Test-Retest Tracking of Individuals is possible

Higher Aptitude – Lower Variance



AFS AFQT Range Restrictions

2005 E7 Promotion Pool



Job Difficulty Across AFS

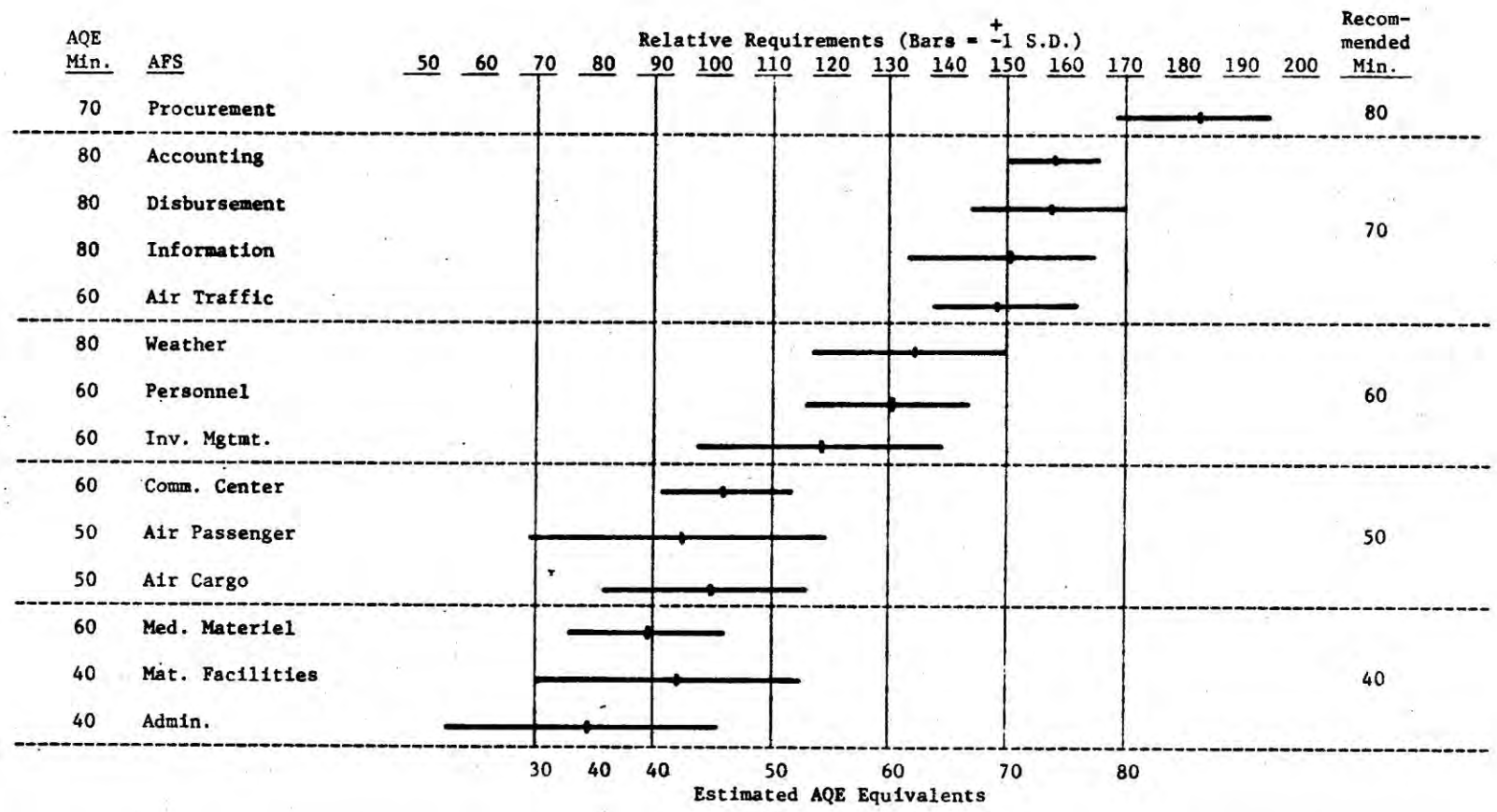


Figure 4. Relative Aptitude Requirements for 1st-Termer Jobs in 14 Career Ladders.

Job Difficulty WITHIN an AFS

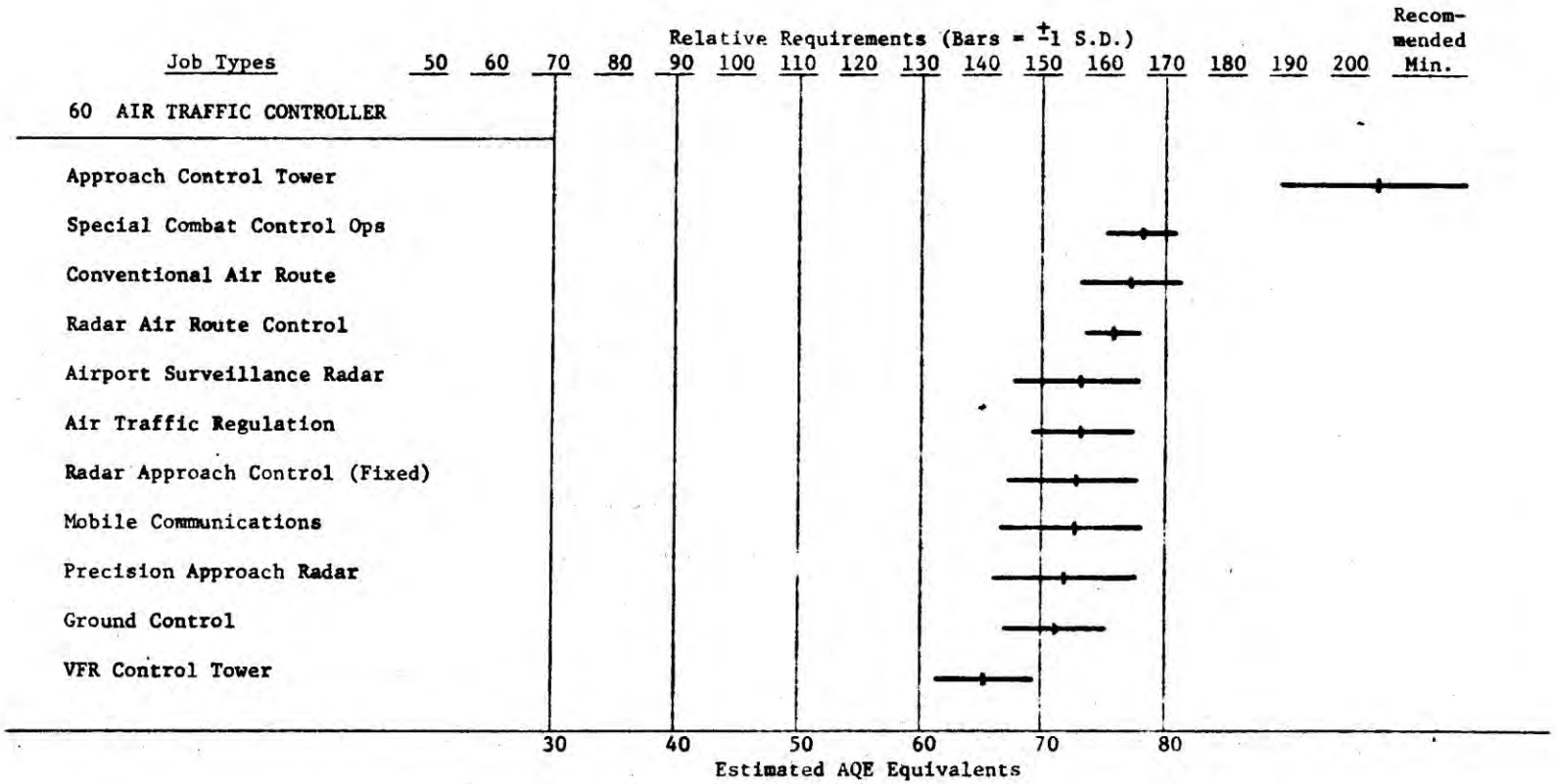


Figure 5. Relative Aptitude Requirements for 1st-Termer Job Types in the Air Traffic Controller Career Ladder.

Job Satisfaction, Aptitude & Reenlistment

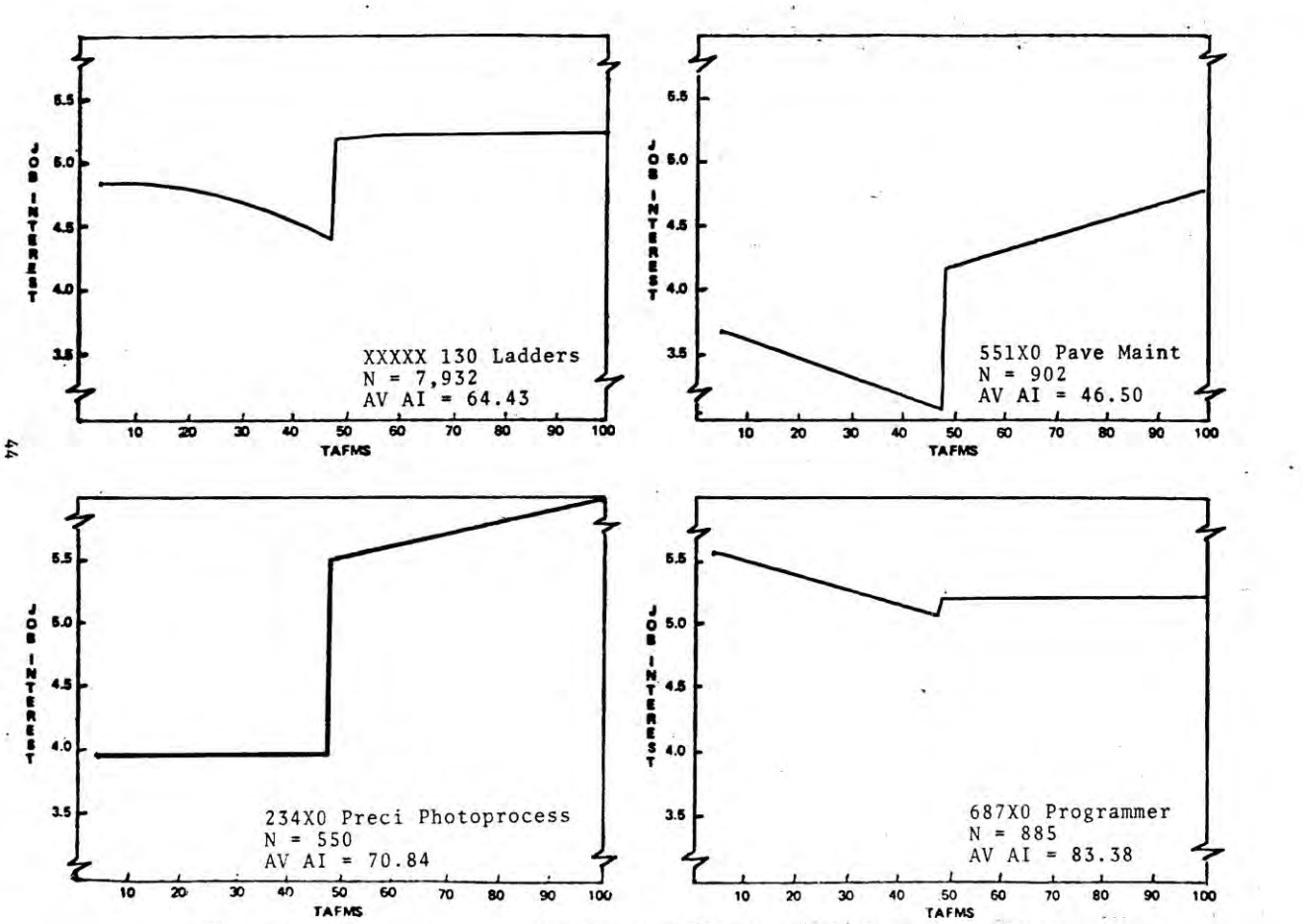
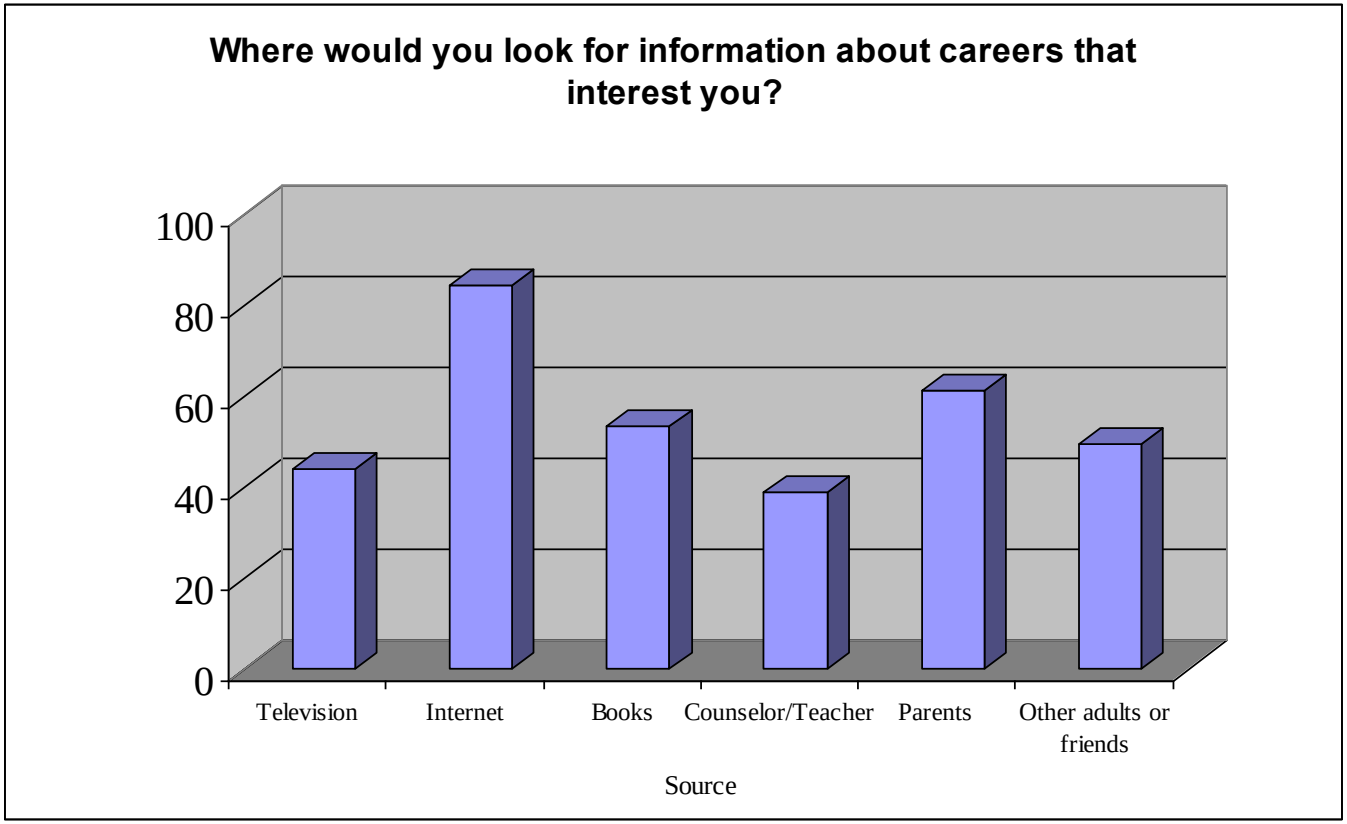


Figure 8. Job Interest versus TAFMS (Holding Aptitude Constant) for Career Fields XXXXX, 551X0, 234X0, and 687X0

Complications

- In the US “All volunteer force”, “volunteer” comes before “force”
- The Millennial Generation Applicant pool…
  - Doesn’t trust “manipulated” information
  - Want’s Choice
  - Searches the Internet for validation

Who are the Career Influencers for the Hispanic Millennials?



The Internet is by far the most used source of information, followed by parents, and books. School counselors and teachers are at the bottom of the list.

(Brazel, 2005)

The Conundrum

- There are nearly insurmountable obstacles for the Air Force to centrally manage an effective person-job-match system in today's environment.
  - Legal – can't use different norms/challenges
  - Logistical – can't get into MEPS
  - 60% of new accessions arrive at Basic Training with "guaranteed" jobs based on interactions with the recruiter & people at the Military Entrance Processing Station (MEPS). Programmed available seats at training facilities drive this person-job match

The SDI+ Initiative Proposal

- Use, in-place Occupational Survey Program to tie personality constellations to job titles within AFSs
- Use self-reported Job Satisfaction to determine which response profiles “encourage” or “discourage” reenlistment
- Develop Person-Job-Match from job incumbents positive/negative constellations to applicant profiles for self-service Internet-based delivery.
- Developing useful metrics and automatic matching procedures represents the next big challenge.

The Psychometric Challenges

- How do you “collect” and “use” measurements to produce a valid and fair process of selection, classification, etc?
- Despite the literature over the past 30-40 years, “psychometric” is not synonymous with “Item Response Theory” (IRT)
- Recent work in “Information Decision Making” for classification purpose holds great promise – but it needs to be tailored to side-step some IRT assumptions/formulations.

The Psychometric Challenges

- Understanding the CONTEXT of the Process is essential.
- Person-Job Match is complex and multi-dimensional

The Psychometric Challenges

- Temperament survey items are NOT measures of an underlying one-dimensional “ability” (i.e. they are Beyond the “More is Better” or “g” Paradigm)
- There is no global “good” or “bad” valence for an item. Each item has a job domain-specific valence as a reinforcer or detractor of specific match quality.
- Temperament surveys items actually measure complex “behavior” in response to complex stimuli. Job satisfaction impact has been shown to NOT be symmetric around the neutral point.
- High level factors and facets are too broad for effective use in operational Person-Job Match procedures

The Psychometric Work Ahead

"More is Better" Paradigm Shift Issues to be worked over the next 6 months:

- **Countering "a priori" interjections of assumed "value" (the socially desirable keying issue)**
- **Analyzing Dichotomized response options to Address Dimensional Complexities (Some times a "3" or "4" is better than a "5" for successful matching)**
- **Demonstrating the stability of temperament over time at the lowest possible levels – not just "Big Five," or Facet levels, but at the "little 220" SDI+ item level. (Item compromise is irrelevant)**

The Right Criterion

- With the proposed survey of recently re-enlisted personnel (our "virtual mentors") we finally will have access to a reasonable criterion
- While "job satisfaction" is the key measurement for the criterion, it must be collected from a highly select sample, i.e. people who:
  - Just Chosen the Air Force as a way of life,
  - Were deemed qualified and a valuable asset to the needs of the future Air Force, and
  - Can be linked to current Air Force jobs and job-type structures

The Final "Miracle Occurs Here" Step

- **Working out the mathematics to use this information and automatically compute report the quality of the match to applicants – well that's next year's IMTA paper.**

Any Questions?

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